

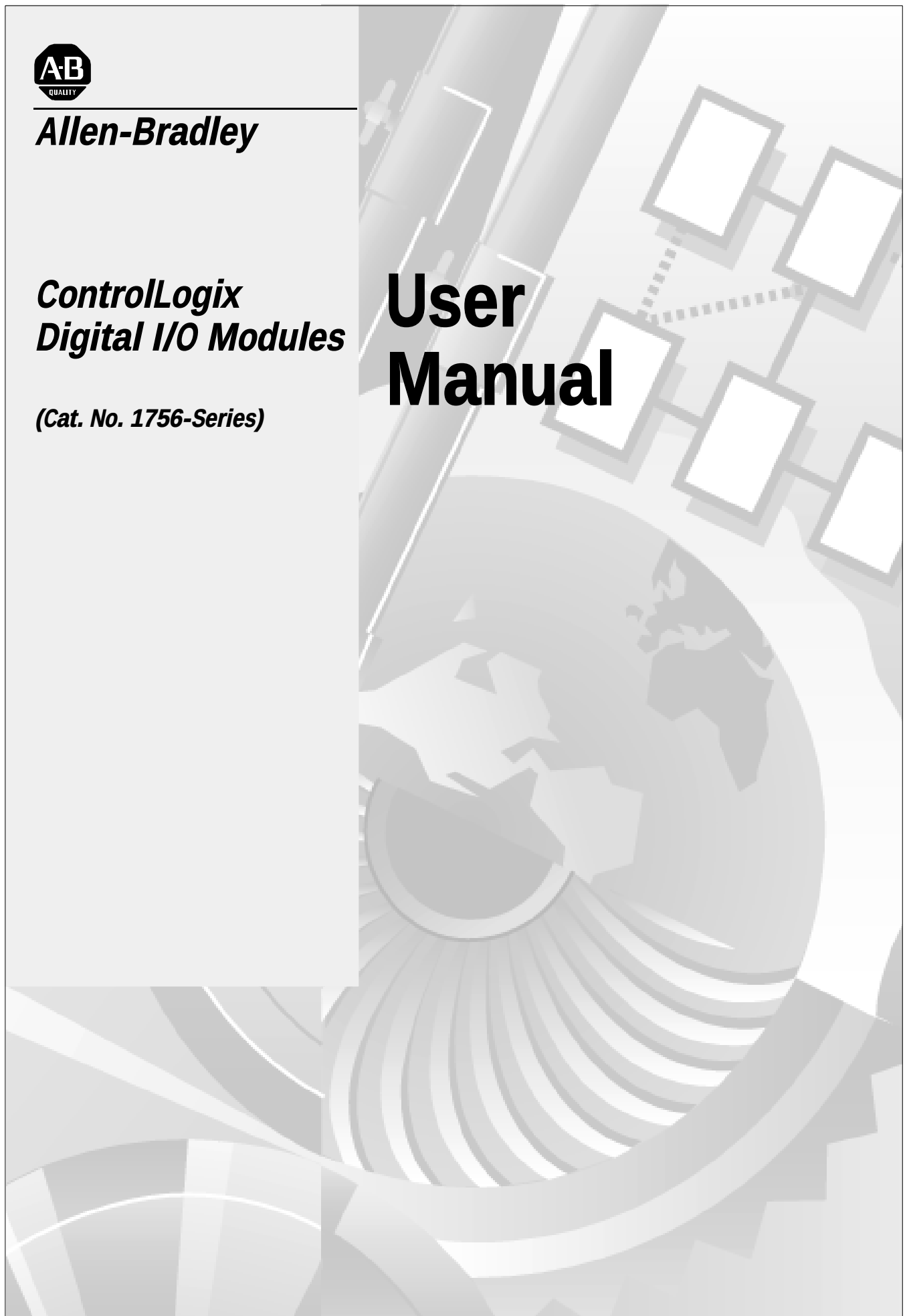


Allen-Bradley

***ControlLogix
Digital I/O Modules***

(Cat. No. 1756-Series)

User Manual



Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. “Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls” (Publication SGI-1.1) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will the Allen-Bradley Company be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, the Allen-Bradley Company cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Allen-Bradley Company with respect to use of information, circuits, equipment, or software described in this manual.

Reproduction of the contents of this manual, in whole or in part, without written permission of the Allen-Bradley Company is prohibited.

Throughout this manual we use notes to make you aware of safety considerations.



ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.

Attentions help you:

- identify a hazard
- avoid the hazard
- recognize the consequences

Important: Identifies information that is especially important for successful application and understanding of the product.

About This User Manual

What This Preface Contains

This preface describes how to use this manual. The following table describes what this preface contains and its location.

For information about	See page
Who Should Use This Manual	
Purpose of This Manual	
Conventions and Related Terms	
Related Products and Documentation	
Rockwell Automation Support	

Who Should Use This Manual

You must be able to program and operate an Allen-Bradley ControlLogix™ automation controller (AC) to efficiently use your digital I/O modules.

We assume that you know how to do this in this manual. If you do not, refer to the Logix 5550 Processor User Manual, publication 1756-6.5.xx, before you attempt to use this module.

Purpose of This Manual

This manual describes how to install, configure, and troubleshoot your ControlLogix digital I/O module.

Conventions and Related Terms

This manual uses the following conventions:

This icon:	Call attention to:
	helpful, time-saving information
	an example
	additional information in the publication referenced

Terms

This term:	Means:
These terms have not been determined yet.	

Related Products and Documentation

The following table lists related ControlLogix products and documentation:

Cat. number:	Document title:	Pub. number:
1756-PA72, -PB72	ControlLogix Power Supply Installation Instructions	1756-5.1
1756-A4, -A7, -A10, -A13	ControlLogix Chassis Installation Instructions	1756-5.2
1756 Series	ControlLogix Module Installation Instructions (Each module has separate document for installation.)	1756-5.5 -5.42
1756-xxxx	Logix 5550 Processor User Manual	1756-x.x
1756-CNB	ControlLogix ControlNet Bridge User Manual	1756-6.5.xx
1756-DHRIO	ControlLogix Data Highway Plus Communication Interface Module User Manual	1756-6.5.2
1756-ENET	ControlLogix Ethernet Communication Interface Module User Manual	1756-6.5.1

If you need more information on these products, contact your local Allen-Bradley integrator or sales office for assistance. For more information on the documentation, refer to the Allen-Bradley Publication Index, publication SD499.

Rockwell Automation Support

Rockwell Automation offers support services worldwide, with over 75 sales/support offices, 512 authorized distributors and 260 authorized systems integrators located throughout the United States alone, as well as Rockwell Automation representatives in every major country in the world.

Local Product Support

Contact your local Rockwell Automation representative for:

- sales and order support
- product technical training
- warranty support
- support service agreements

Technical Product Assistance

If you need to contact Rockwell Automation for technical assistance, please review the troubleshooting information in Appendix A first. If the problem persists, then call your local Rockwell Automation representative.

Your Questions or Comments on this Manual

If you find a problem with this manual, please notify us of it on the enclosed Publication Problem Report.

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What is ControlLogix Digital I/O?

What This Chapter Contains

This chapter describes the ControlLogix digital modules and what you must know and do before you begin to use them. The following table describes what this chapter contains and its location.

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Compliance to European Union Directives	1-1
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What is ControlLogix Digital I/O?

ControlLogix digital I/O modules are interface modules that provide ON/OFF detection and actuation. They only produce information when needed and support communication with other existing I/O architectures while providing additional system functionality.

The following is a list of the features available on ControlLogix digital I/O modules that allow greater system applications.

- Removal and Insertion Under Power (RIUP) - a system feature that allows you to remove and insert modules and RTBs while power is applied
- Producer/Consumer communications - an intelligent data exchange between modules in which each module produces data without having been polled
- Group-to-Group isolation basis - individually isolated I/O modules
- Individual isolation
- Field-to-System isolation

Using an I/O Module in the ControlLogix System

ControlLogix modules mount in a ControlLogix chassis and use a Removable Terminal Block (RTB) or Interface Module (IFM) to connect all field-side wiring.

Before you install and use your module you should have already:

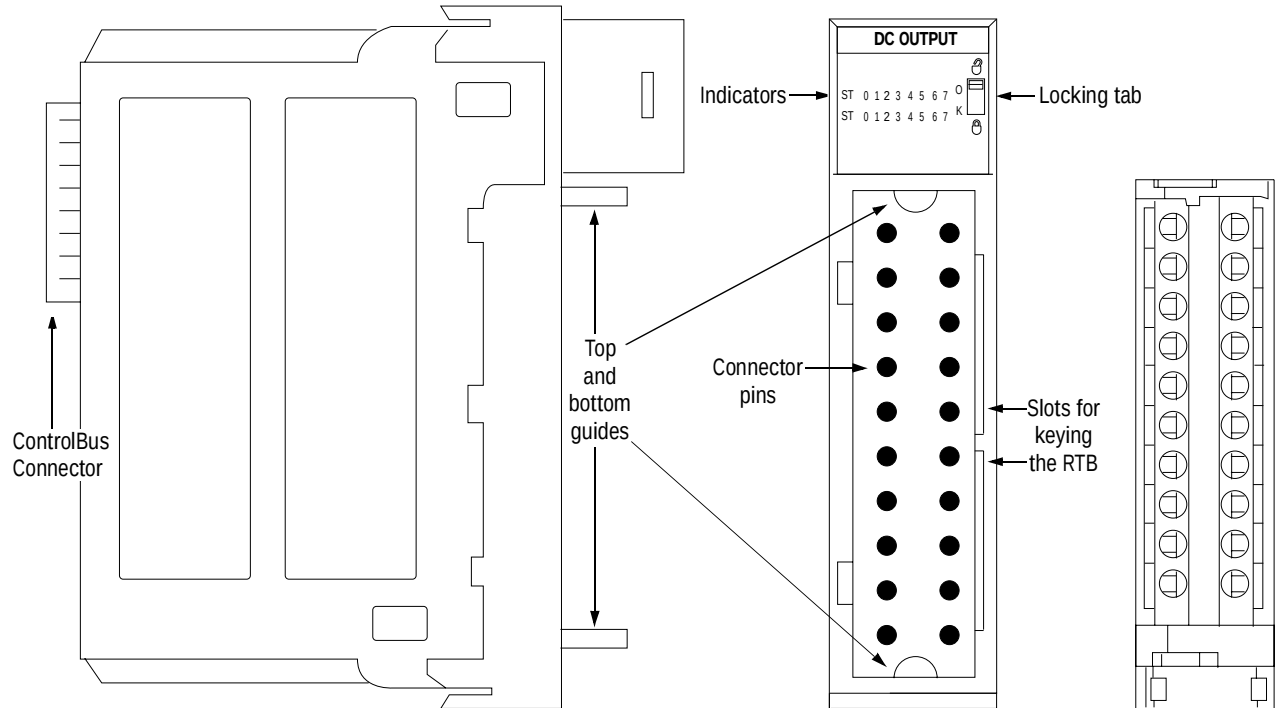
- installed and grounded a 1756 chassis and power supply. To install these products, refer to publications 1756-5.1 and 1756-5.2.
- ordered and received an RTB or IFM and its components for your application.

Note: RTBs and IFMs are not included with your module purchase.

Types of ControlLogix Digital I/O

Catalog Number	Description
1756-IA16	AC (79-132V) input module
1756-IA16I	AC (79-132V) isolated input module
1756-IA8D	AC (79-132V) diagnostic input module
1756-IB16	DC (10-31.2V) input module
1756-IB16D	DC (10-30V) diagnostic input module
1756-IB16I	DC (10-30V) isolated input module
1756-IB32	DC (10-31.2V) input module
1756-IC16	DC (30-60V) input module
1756-IH16I	DC (90-146V) isolated input module
1756-IM16I	AC (159-265V) input module
1756-IN16	AC (10-30V) input module
1756-OA16	AC (74-265V) output module
1756-OA16I	AC (74-265V) isolated output module
1756-OA8	AC (74-265V) output module
1756-OA8D	AC (74-132V) diagnostic output module
1756-OA8E	AC (74-132V) electronically fused output module
1756-OB16D	DC (19.2-30V) diagnostic output module
1756-OB16E	DC (10-31.2V) electronically fused output module
1756-OB16I	DC (10-30V) output module
1756-OB32	DC (10-31.2V) output module
1756-OB8	DC (10-30V) output module
1756-OB8EI	DC (10-30V) isolated electronically fused output module
1756-OC8	DC (30-60V) output module
1756-OH8I	DC (90-146V) isolated output module
1756-ON8	AC (10-30V) output module
1756-OW16I	AC (10-265V) DC (5-150V) isolated contact module
1756-OX8I	AC (10-265V) DC (5-150V) isolated relay module

Features of the ControlLogix Digital I/O Modules



40200-M

Controlbus connector - The backplane connector interface for the ControlLogix system connects the module to the Controlbus backplane.

Connectors pins - Input/output, power and grounding connections are made to the module through these pins with the use of an RTB or IFM.

Locking tab - The locking tab anchors the RTB or IFM cable on the module, maintaining wiring connections.

Slots for keying - Mechanically keys the RTB to prevent inadvertently making the wrong wire connections to your module.

Status indicators - Indicators display the status of communication, module health and input/output devices. Use these indicators to help in troubleshooting.

Top and bottom guides - Guides provide assistance in seating the RTB or IFM onto the module.

Prevent Electrostatic Discharge

This module is sensitive to electrostatic discharge.



ATTENTION: Electrostatic discharge can damage integrated circuits or semiconductors if you touch backplane connector pins. Follow these guidelines when you handle the module:

- Touch a grounded object to discharge static potential
 - Wear an approved wrist-strap grounding device
 - Do not touch the backplane connector or connector pins
 - Do not touch circuit components inside the module
 - If available, use a static-safe work station
 - When not in use, keep the module in its static-shield box
-

Removal and Insertion Under Power

These modules are designed to be installed or removed while chassis power is applied.



ATTENTION: When you insert or remove a module while backplane power is applied, an electrical arc may occur. An electrical arc can cause personal injury or property damage by:

- sending an erroneous signal to your system's field devices causing unintended machine motion or loss of process control.
- causing an explosion in a hazardous environment.

Repeated electrical arcing causes excessive wear to contacts on both the module and its mating connectors. Worn contacts may create electrical resistance that can affect module operation.

Compliance to European Union Directives

If this product bears the CE marking, it is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

EMC Directive

This product is tested to meet Council Directive 89/336/EEC Electromagnetic Compatibility (EMC) and the following standards, in whole or in part, documented in a technical construction file:

- EN 50081-2EMC - Generic Emission Standard, Part 2 - Industrial Environment
- EN 50082-2EMC - Generic Immunity Standard, Part 2 - Industrial Environment

This product is intended for use in an industrial environment.

Low Voltage Directive

This product is tested to meet Council Directive 73/23/EEC Low Voltage, by applying the safety requirements of EN 61131-2 Programmable Controllers, Part 2 - Equipment Requirements and Tests.

For specific information required by EN 61131-2, see the appropriate sections in this publication, as well as the following Allen-Bradley publications:

- Industrial Automation Wiring and Grounding Guidelines For Noise Immunity, publication 1770-4.1
- Automation Systems Catalog, publication B111

This equipment is classified as open equipment and must be installed (mounted) in an enclosure during operation as a means of providing safety protection.

Chapter Summary and What's Next

In this chapter you learned about:

- what ControlLogix digital I/O is
- types of ControlLogix digital I/O

Move on to Chapter 2 to learn about ControlLogix I/O module features.

ControlLogix I/O Interface and System Design

What This Chapter Contains

This chapter describes devices compatible with ControlLogix I/O, how to set fuses for output modules, and features that are specific to various modules. The following table describes what this chapter contains and its location.

For information about	See page
Determining Module Compatibility	
Using Field-Side Features of ControlLogix Digital Modules	
Using System-Side Features of ControlLogix Digital Modules	
Chapter Summary and What's Next	

Determining Input Module Compatibility

ControlLogix digital input modules interface to sensing devices and detect whether they are ON or OFF.

ControlLogix I/O inputs convert ac or dc ON/OFF signals from user devices to appropriate logic level for use within the processor. Typical input devices include:

- proximity switches
- limit switches
- selector switches
- float switches
- pushbutton switches

When designing a system using ControlLogix input modules, you must consider the voltage necessary for your application, whether you need a solid state device and must account for current leakage, and if your application should use sinking or sourcing wiring.

For more information on specific compatibility of other Allen-Bradley Company products to ControlLogix input modules, see the I/O Systems Overview, publication CIG-2.1.

Determining Output Module Compatibility

The ControlLogix I/O may be used to drive a variety of output devices. Typical output devices compatible with the ControlLogix I/O outputs include:

- motor starters
- solenoids
- indicators

When designing a system, make sure that the ControlLogix I/O output can supply the necessary surge and continuous current for proper operation. Take care to ensure that the surge and continuous current are not exceeded. Damage to the module could result.

The ControlLogix I/O outputs are capable of directly driving the ControlLogix I/O inputs. The exceptions are the ac and dc diagnostic input modules. When diagnostics are used a shunt resistor is required for leakage current.

For more information on specific compatibility of other Allen-Bradley Company products to ControlLogix input modules, see the I/O Systems Overview, publication CIG-2.1.

When sizing output loads, check the documentation supplied with the output device for the surge and continuous current needed to operate the device.

Using Features Common to All ControlLogix Digital I/O Modules

The following features are common to all ControlLogix digital I/O modules:

Removal and Insertion Under Power (RIUP)

All ControlLogix modules may be inserted and removed from the chassis while power is applied. This feature allows greater availability of the overall control system because, while the module is being removed or inserted, there is no additional disruption to the rest of the controlled process.

Module Fault Reporting

ControlLogix digital I/O modules provide indication when a module fault has occurred. This feature allows you to determine how communication with your module has been affected and what action should be taken to resume normal communication.

Fully Software Configurable

RS Logix 5000 provides you the opportunity to configure your ControlLogix digital I/O modules through a software platform. Although you may still write and adjust configuration through ladder logic, this feature allows greater efficiency determining your module's settings for any application.

Electronic Backplane Keying

Instead of plastic mechanical backplane keys, electronic keying allows the ControlLogix system to identify what modules belong in the various slots of a configured system.

When you complete the initial configuration for a digital I/O module, a ControlLogix processor owns the configuration data and, therefore, becomes the owner of that specific module. Check this information before you configure a module:

- Vendor - Rockwell Automation Allen-Bradley
- Product Type - Digital I/O
- Catalog Number - 1756-OA8D/A
- Revision - 2.2

Access to System Clock for Timestamping Functions

The ControlLogix chassis maintains a system clock. You can synchronize your digital I/O module with this clock. Such synchronization allows you to time stamp input data or to schedule output data transmissions.

This feature allows for accurate calculations between events to help you identify the sequence of events in either a fault condition or in their process actions. The system clock can be used between multiple modules and is also known as the Coordinated System Time (CST).

Use of Producer/Consumer Model

By using the Producer/Consumer model, ControlLogix I/O modules can produce data without having been polled by a controller first. The modules produces the data and any other owner controller device can decide to consume it.

For example, if two or more processors own a single I/O module, the module produces the data and any number of processors can consume the data at the same time. This eliminates the need for one processor to send the data to another processor.

LED Status Information

Each ControlLogix digital I/O module has an LED indicator on the front of the module that allows you to check the module health and operational status of a module. The LED displays varied for each module.

The following statuses can be checked with the LED indicators:

- I/O status - This display indicates the state of the field device.
- Module status - This display indicates the module's communication status.
- Fault status - This display is only found on some modules and indicates the presence or absence of various faults.
- Fuse status - This display is only found on electronically fused modules and indicates the state of the module's fuse.

Fully Class I Division 2 Compliance

All ControlLogix digital I/O modules are maintain Class I Division 2 system certification. This allows the ControlLogix system to be placed in a environments other than only a 100% hazard free.

CE/CSA/UL/FM Agency Approvals

Any ControlLogix digital I/O modules that have obtained CE/CSA/UL/FM agency approval are marked as such. Ultimately, all digital modules will have these agency approvals and marked accordingly.

Using Features Common to All ControlLogix Digital Input Modules

The following features are common to all ControlLogix digital input modules:

Isolated and Non-Isolated Varieties of Modules

ControlLogix input modules provide isolated or non-isolated wiring configurations (THIS IS NOT THE WORD I WANT HERE. WHAT IS?). Some applications require power for the I/O circuits to originate on separate, isolated, power sources. Because conditions such as this require separate commons for each channel, some input modules utilize individual isolation, or point-to-point isolation.

Other types of isolation available with ControlLogix input modules are channel-to-channel isolation or no isolation. Your specific application will determine what type of isolation is necessary and which input module to use.

Multiple Point Densities

ControlLogix input modules use either 8, 16, or 32 point densities. This range allows flexibility within your application.

Software Configurable Filter Times

ON to OFF and OFF to ON filter times can be adjusted through the RS Logix 5000 for all ControlLogix input modules. These filters improve noise immunity within a signal. A stricter use of filters affects the length of delay times for signals to and from these modules.

Data Transfer on Either Change of State or Cyclic Time

Your ControlLogix input module will send data on one of two bases:

- Change of State - If you choose this feature, the input module will send data to the owner controller whenever it input data changes. This selection provides a “heartbeat” update every 750ms to make sure that the input is still available and healthy.
- Cyclic - If you choose this feature, the input module will send data to the owner controller at regular intervals. This selection guarantees that new I/O data is regularly available for the processor to consume when it next evaluates logic requiring the input state.

Using Features Common to All ControlLogix Digital Output Modules

The following features are common to all ControlLogix digital output modules:

Isolated and Non-Isolated Varieties of Modules

As with input modules, ControlLogix output modules provide isolated or non-isolated wiring configurations (THIS IS NOT THE WORD I WANT HERE. WHAT IS?). Various applications require different types of wiring. Output modules provide point-to-point, group-to-group, or no isolation. Your specific application will determine what type of isolation is necessary and which input module to use.

Multiple Point Densities

ControlLogix output modules use either 8, 16, or 32 point densities. This range allows flexibility within your application.

Output Data Echo

When a processor sends a command out to the ControlLogix system, the output module that is targeted for that command has the capability of returning a message to the processor to verify the module received the command and will try to execute it.

This feature cannot respond to the processor that the field-side device connected to the output module has executed the command. If your application requires a more detailed response than only acknowledging the receipt of a command, see the output verify feature of diagnostic output modules as defined later in this chapter.

Configurable Output States at Communication Failures

If a communication fault occurs during the Program mode, the module automatically enters the Program to Fault Transition and then transitions to the Communication Fault Mode.

The Program to Fault Transition feature determines whether or not the states of the outputs will be changed to those specified by the Fault mode and Fault value functions.

Program to Fault Transition

If this feature is disabled when a communications fault occurs, the states of the output points will not change as the module transitions to the Communications Fault Mode.

If this feature is enabled when a communications fault occurs, the states of the output points will change to one of three values specified in the Fault Mode and Fault Value features.

Fault Mode and Fault Value

These two features determine what happens to the output of each point after a communications fault occurs.

If the Fault Mode feature is cleared for a point, the point's output will be changed to the corresponding Fault Value: ON or OFF. If the Fault Mode feature is set for a point, the point's output will be left at its last state.

Fusing

Some digital outputs have internal electronic or mechanical fusing to prevent too much current from flowing through the module. This feature protects the module from electrical damage. Other modules require external fusing.

Reset an electronic fuse through RS Logix 5000 configuration software or through ladder logic running on a controller.

Note: Electronic fuses are also reset through a software reset or when the output module is powered down and back up.

The following modules use electronic fusing:

- 1756-OA8D
- 1756-OA8E
- 1756-OB16D
- 1756-OB16E
- 1756-OB8EI

Use the following Table 2.B to determine what fuse to use.

Table 2.B Recommended Fuses

Circuit Type	Catalog Number	Rating in Amps		Maximum Surge Current (repeatable)	Recommended Fuse	Fuse Supplier
		@30°C	@ 60°C			
AC	1756-OA8	5A	4A	20A for 43ms, every 2s		
	1756-OA8D	8A	4A	8A for 50ms, every 2s	Electronically fused	
	1756-OA8E	8A	4A	20A for 43ms, every 2s	Electronically fused	
	1756-OA16	N/A	2A	5A for 43ms, every 2s		
	1756-OA16I	5A	4A	20A for 43ms, every 2s		
	1756-ON8	N/A	4A	20A for 43ms, every 2s		
DC	1756-OB8	N/A	8A	4A for 10ms, every 1s		
	1756-OB8EI	N/A	8A	4A for 10ms, every 2s	Electronically fused	
	1756-OB16D	8A	4A	4A for 10ms, every 1s	Electronically fused	
	1756-OB16E	N/A	8A	2A for 10ms, every 2s	Electronically fused	
	1756-OB16I	8A	4A	4A for 10ms, every 2s		
	1756-OB32	N/A	5A	2A for 10ms, every 2s		
	1756-OC8	N/A	8A	4A for 10ms, every 1s		
	1756-OH8I	N/A	8A	4A for 10ms, every 1s		
Relay	1756-OW16I					
	1756-OX8I					

Using Diagnostic Features of Diagnostic Digital I/O Modules

Diagnostic ControlLogix digital I/O modules provide the following features:

Point Level Fault Reporting

Diagnostic ControlLogix digital I/O modules provide indication when a fault has occurred on a point-by-point basis. This feature allows the other points to continue sending and receiving data even if another point has faulted.

Diagnostic Latch of Information

Diagnostic latching allows ControlLogix diagnostic digital I/O modules to latch a function in the set position once it has been triggered, even if the error condition causing the function to occur disappears. Some diagnostic features are not affected by latching.

Use the following table to determine which features are and are not affected:

I/O	Affects:	Does not Affect:
Input	Wire Off Loss of Field Power	
Output	No Load Output Verify Zero Cross	Short Circuit/Overload Pulse Test

Latched diagnostic features can be cleared by disabling the Diagnostic Latch function or by the Reset Diagnostic Latch function.

Open Wire Detection

The Open Wire Detection feature is found on input modules. A leakage resistor is placed across an input device. This leakage is then expected to exist when the input is open, resulting in three distinct states for an input: ON, OFF, and Open.

This function is best used in applications that require that the inputs be constantly monitored to assure they represent the true state of the critical input device and not that a wire has broken free from the input terminal.

When an Open Wire condition is detected, a point-level alarm is sent to the processor to identify the exact point of the fault.

No Load Detection

The No Load feature is found on output modules. For each output point, No Load detects the absence of field wiring or a missing load.

Field Side Output Verification

Unlike the Output Data Echo feature associated with all ControlLogix digital output modules, output verification assures the use that logic side instructions that the module consumes are accurately represented on the power side of a switching device. The diagnostic output module can not only tell a processor that it received a command, the module can also respond whether or not the field-side device connected to the module has executed the command.

For example, in applications that need to verify that the module has accurately followed the processor's instructions, the ControlLogix system samples the power side and compares it to the logic side.

If a miscompare is identified, an alarm diagnostic specifies the exact point location where the miscompare occurred.

Point Level Electronic Fusing

Diagnostic ControlLogix digital I/O modules use electronic fusing to prevent the surge of too much current through a point on the module. If too much current begins to flow through a point, the fuse for that point is tripped but other points on the module continue to operate as normal.

When a fuse tripped, an alarm specifies the exact point of the trip. Electronic fuses can be reset through RS Logix 5000, ladder logic, or a software reset.

Pulse Test

Pulse Test is a feature found on output modules that can verify output-circuit functionality during operation without actually changing the state of the output load device.

A short pulse is sent to the targeted output circuit. The circuit should respond as it would if a real change-of-state command was issued but the diagnostic module verifies that continuity is present and a short or overload condition does not exist.

Diagnostic Time Stamp

Diagnostic ControlLogix digital I/O modules are capable of placing a time stamp on the transmission of data. This feature provides greater accuracy and flexibility in running applications.

The modules use the ControlLogix system clock, located in the backplane chassis, to associate time stamps with data transmissions.

8 Point AC/16 Point DC

Diagnostic ControlLogix digital I/O modules provide various grouping of points on different modules. The 8 point AC modules and 16 point DC modules provide additional flexibility when designing module applications.

Chapter Summary and What's Next

In this chapter you learned about:

Installing the ControlLogix I/O Module

What this Chapter Contains

This chapter describes how to install ControlLogix modules. The following table describes what this chapter contains and its location.

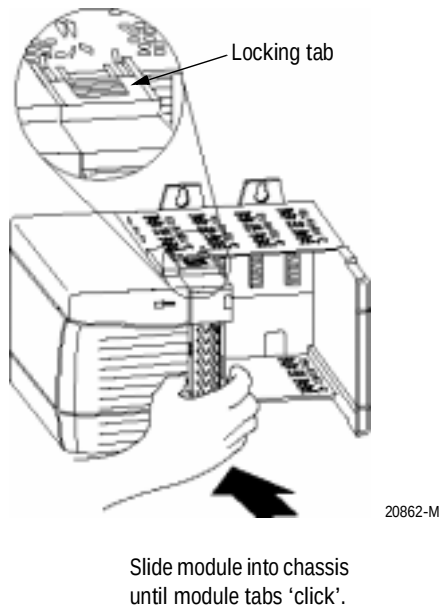
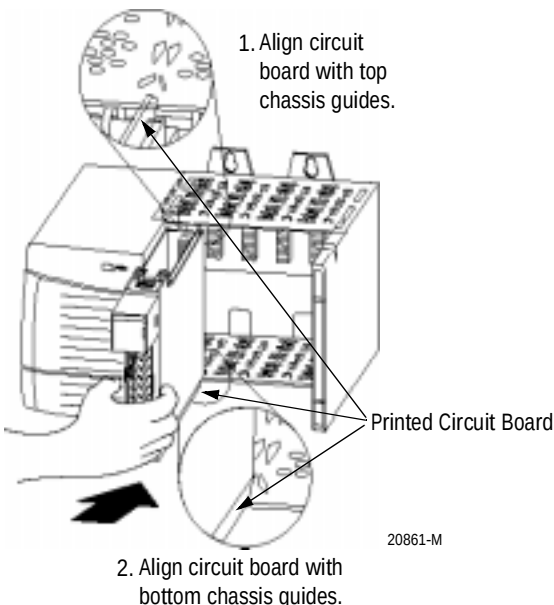
For information about	See page
Installing the ControlLogix I/O Module	
Keying the Removable Terminal Block and the Interface Module	
Connecting Wiring	
Assembling the Removable Terminal Block and the Housing	
Installing the Removable Terminal Block or Interface Module onto the Module	
Checking the Indicators	
Removing the Removable Terminal Block from the Module	
Removing the Module from the Chassis	
Chapter Summary and What's Next	

Installing the ControlLogix I/O Module

You can install or remove the module while chassis power is applied.



ATTENTION: The module is designed to support Removal and Insertion Under Power (RIUP). However, when you remove or insert an RTB with field-side power applied, **unintended machine motion or loss of process control can occur**. Exercise extreme caution when using this feature.



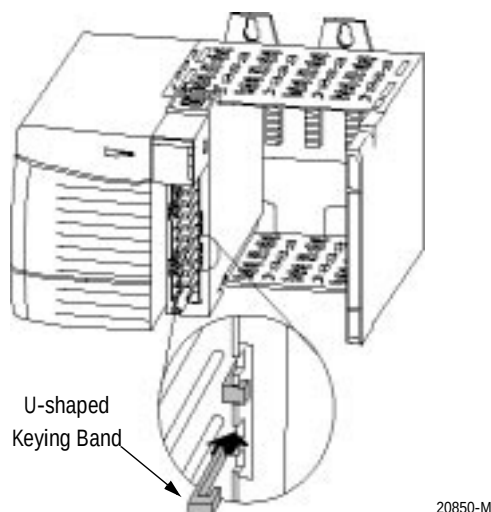
Keying the Removable Terminal Block and the Interface Module

Key the RTB or IFM in order to prevent inadvertently connecting the incorrect RTB/IFM to your module.

When the RTB mounts onto the module, keying positions will match up. For example, if you place a U-shaped keying band in position #6 on the module, you cannot place a wedge-shaped tab in #6 on the RTB or your RTB will not mount on the module.

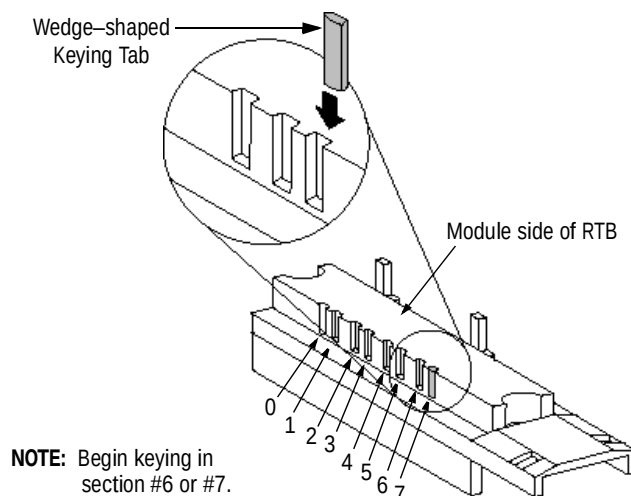
We recommend that you use a unique keying pattern for each slot in the chassis.

1. Insert the U-shaped band with the longer side near the terminals. Push the band onto the module until it snaps into place.



2. Key the RTB in positions that correspond to unkeyed module positions. Insert the wedge-shaped tab on the RTB with the rounded edge first. Push the tab onto the RTB until it stops.

Note: When keying your RTB and module, you must begin with a wedge-shaped tab in position #6 or #7.



Connecting Wiring

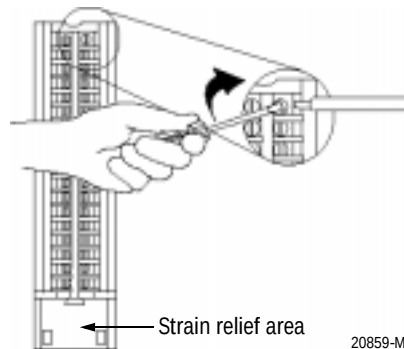
You can use an RTB or IFM to connect wiring to your module. If you are using an RTB, follow the directions below to connect wires to the RTB. An IFM has been prewired before you received it.

If you are using an IFM to connect wiring to the module, skip this section and move to page 3-5.

Three Types of RTBs (each RTB comes with housing)

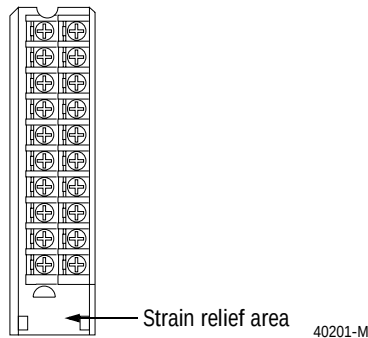
- **Cage clamp** - Catalog number 1756-TBCH

1. Insert the wire into the terminal.
2. Turn the screw clockwise to close the terminal on the wire.



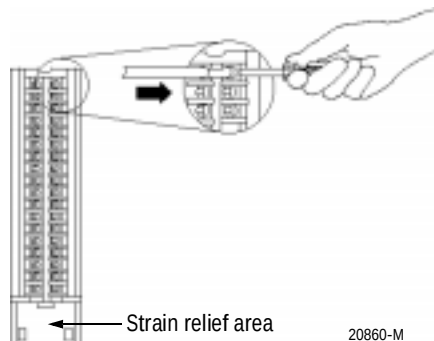
- **NEMA clamp** - Catalog number 1756-TBNH

1. Terminate wires at the screw terminals.



- **Spring clamp** - Catalog number 1756-TBSH or TBS6H

1. Insert the screwdriver into the outer hole of the RTB.
2. Insert the wire into the open terminal and remove the screwdriver.



Recommendations for Wiring Your RTB

We recommend you consider the following guidelines when wiring your RTB:

1. Begin wiring the RTB at the bottom terminals and move up.
2. Use a tie to secure the wires in the strain relief area of the RTB.
3. Order and use an extended-depth housing (Cat. No.1756-TBE) for applications that require heavy gauge wiring.

Refer to Table 3.A below for the page number of the specific wiring diagram for each ControlLogix I/O module.

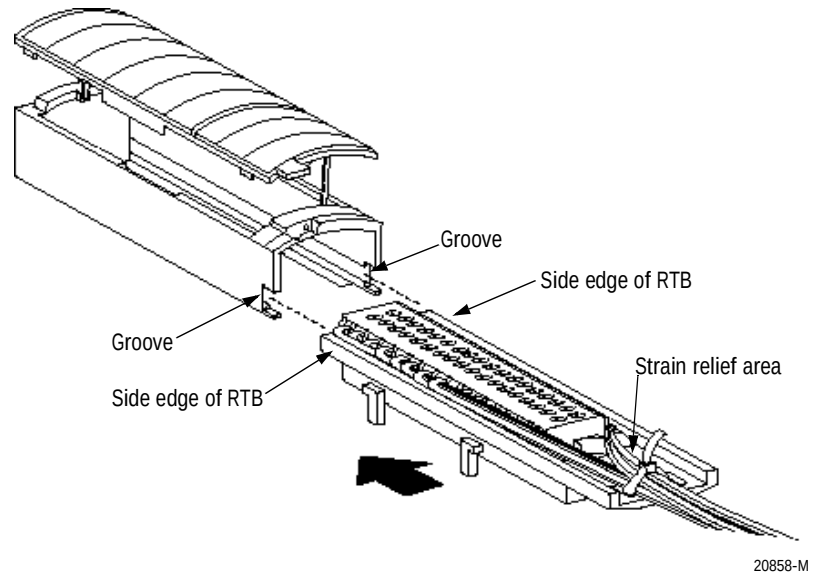
Table 3.A Wiring Connections

Catalog Number	Wiring Connections
1756-IA16	
1756-IA16I	
1756-IA8D	
1756-IB16	
1756-IB16D	
1756-IB16I	
1756-IB32	
1756-IC16	
1756-IH16I	
1756-IM16I	
1756-IN16	
1756-OA16	
1756-OA16I	
1756-OA8	
1756-OA8D	
1756-OA8E	
1756-OB16D	
1756-OB16E	
1756-OB16I	
1756-OB32	
1756-OB8	
1756-OB8EI	
1756-OC8	
1756-OH8I	
1756-ON8	
1756-OW16I	
1756-OX8I	

Assembling The Removable Terminal Block and the Housing

Removable housing covers the wired RTB to protect wiring connections when the RTB is seated on the module.

1. Align the grooves at the bottom of each side of the housing with the side edges of the RTB.
2. Slide the RTB into the housing until it snaps into place.



1756-TBCH RTB shown for reference

Note: If additional wire routing space is required for your application, use extended-depth housing 1756-TBE.

Installing the Removable Terminal Block or Interface Module onto the Module

Install the RTB or IFM onto the module to connect wiring.



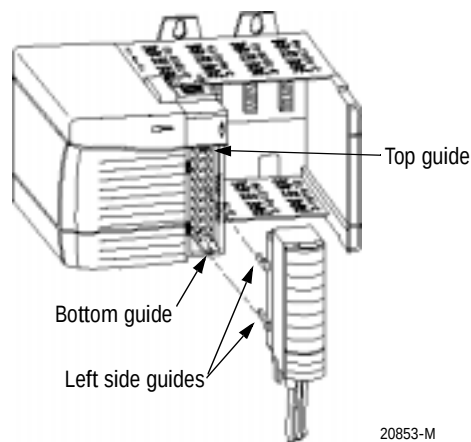
ATTENTION: Shock hazard exists. If the RTB is installed onto the module while the field-side power is applied, the RTB will be electrically live. Do not touch the RTB's terminals. Failure to observe this caution may cause personal injury.

The RTB is designed to support Removal and Insertion Under Power (RIUP). However, when you remove or insert an RTB with field-side power applied, **unintended machine motion or loss of process control can occur**. Exercise extreme caution when using this feature. It is recommended that field-side power be removed before installing the RTB onto the module.

Before installing the RTB, make certain:

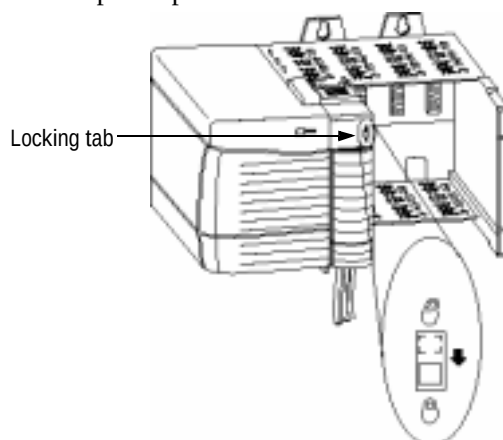
- field-side wiring of the RTB has been completed.
- the RTB housing is snapped into place on the RTB.
- the RTB housing door is closed.
- the locking tab at the top of the module is unlocked.

1. Align the top, bottom and left side guides of the RTB with the guides on the module.



20853-M

2. Press quickly and evenly to seat the RTB on the module until the latches snap into place.



20854-M

3. Slide the locking tab down to lock the RTB onto the module.

Removing the Removable Terminal Block from the Module

If you need to remove the module from the chassis, you must first remove the RTB from the module.

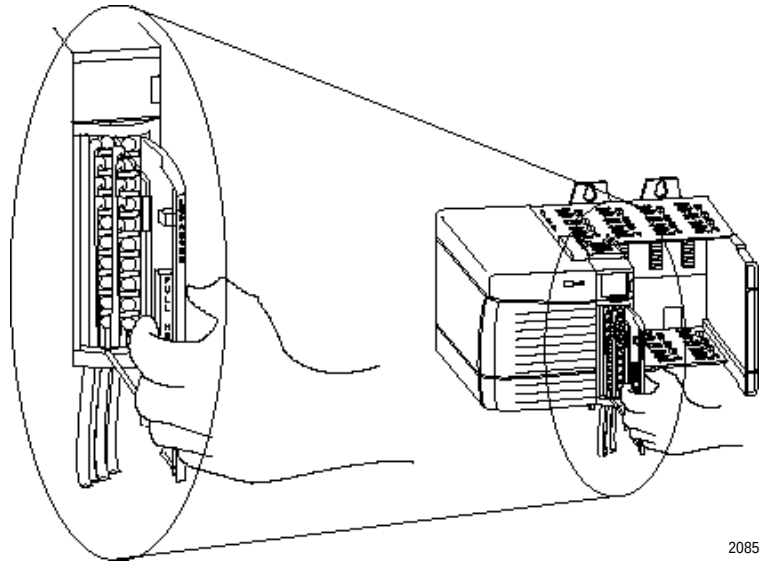


ATTENTION: Shock hazard exists. If the RTB is removed from the module while the field-side power is applied, the module will be electrically live. Do not touch the RTB's terminals. Failure to observe this caution may cause personal injury.

The RTB is designed to support Removal and Insertion Under Power (RIUP). However, when you remove or insert an RTB with field-side power applied, **unintended machine motion or loss of process control can occur**. Exercise extreme caution when using this feature. It is recommended that field-side power be removed before removing the module.

1. Unlock the locking tab at the top of the module.
2. Open the RTB door using the bottom tab.
3. Hold the spot marked PULL HERE and pull the RTB off the module.

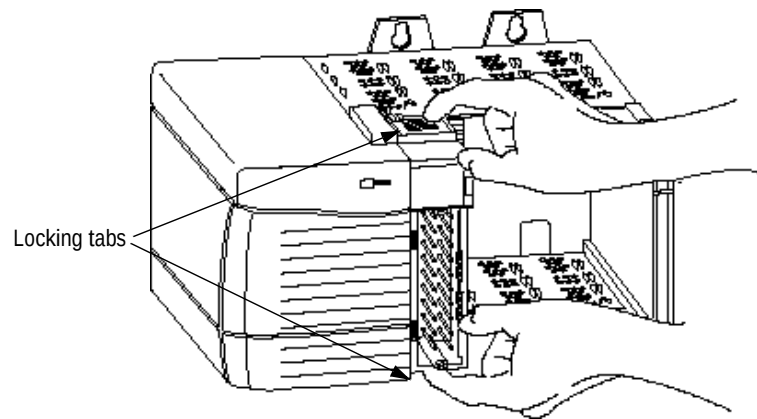
Note: Do not wrap your fingers around the entire door. A shock hazard exists.



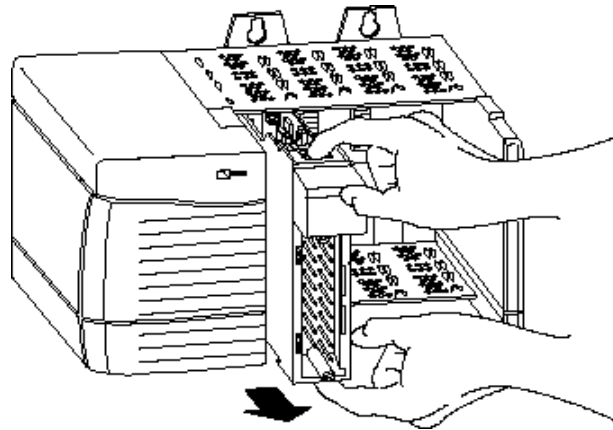
20855-M

Removing the Module from the Chassis

1. Push in the top and bottom locking tabs.



2. Pull module out of the chassis.



Chapter Summary and What's Next

In this chapter you learned about:

- installing the module
- keying the module
- wiring the RTB
- installing the RTB or IFM onto the module
- removing the module

Move on to Chapter 4 to understand how to configure your module.

Configuring Your ControlLogix Digital I/O Modules

What this Chapter Contains

This chapter describes why you must configure your ControlLogix digital I/O modules and how to configure them for use in the ControlLogix system. The following table describes what this chapter contains and its location:

For information about	See page
Why You Must Configure Your I/O Module	
Using the General Methods of Configuring an I/O Module	
Viewing and Changing Module Tags	
Viewing Common Configuration Screens	
Configuring a Standard Input Module	
Configuring a Standard Output Module	
Configuring a Diagnostic Input Module	
Configuring a Diagnostic Output Module	
Editing Configuration	
Chapter Summary and What's Next	

Why You Must Configure Your I/O Module

Your ControlLogix digital I/O module must be configured upon installation. The module is essentially 'stupid', meaning it will not work until it has been configured.

RSLogix 5000 Configuration Software

The RSLogix 5000 software provides access to write configuration for you ControlLogix digital I/O module. You have the option of accepting default configuration for your module or writing point level configuration specific to your application. Both options are explained in detail, including views of software screens, in this chapter.

Ownership of I/O Modules

When you write configuration for a I/O module, you establish ownership by a Logix 5550 processor module of the I/O module. Follow these restrictions when writing configuration for I/O modules:

- ControlLogix digital output modules can only accept one owner controller that will receive the module's output. Individual output points cannot be accessed separately.

If multiple controllers try to control different points on the same module, the owners will overwrite each other's configuration.

- ControlLogix digital input modules allow multiple owner controllers of the same module, but each controller must use the same information when writing configuration information for that module.

If each owner controller does not use the same configuration information as others on the same module, they will each expect the module to behave differently.

Two pieces of data are stored on the module to enforce the previous restrictions: owner information and configuration revision number.

Owner Information

A processor module can connect to an I/O module through an owner or listen-only connection. The type of connection is established in the first step of configuration and will be explained further in this chapter.

If a processor connects to an I/O module as an owner controller, the module maintains the following information about :

- Owner Vendor ID
- Owner Serial Number

These two data bits are automatically written into the module anytime a controller writes new configuration for an I/O module. The module can only save this information for the last owner to specify configuration.

Processors that connect through listen-only connections, do not write configuration and can only listen to the module as long as the owner controller is actively controlling it.

Configuration Revision Number (CRN)

A configuration revision number is sent to the digital I/O module at the beginning of each configuration. This feature makes sure that if an input module has multiple owner controllers, one controller's configuration does not overwrite another controller's configuration.

A module's CRN is set to 0 when the module is first powered up. Whenever a controller tries to configure or reconfigure the module, it must send a CRN that is an increment (by one) of the module's CRN.

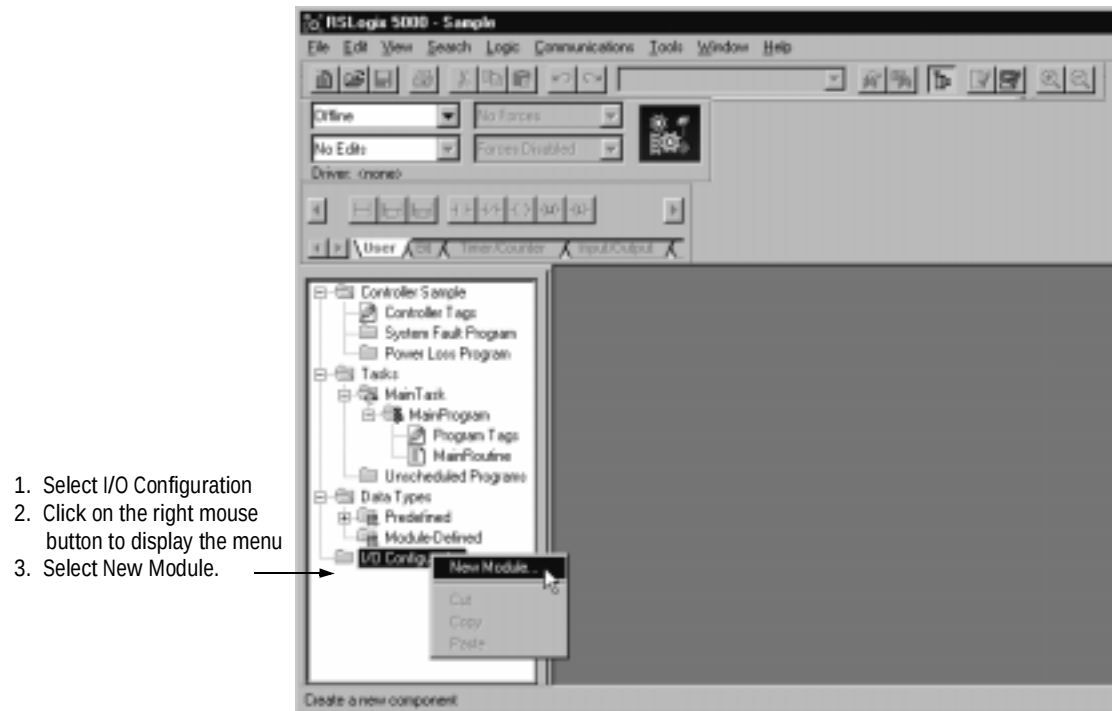
Using the General Methods of Configuring an I/O Module

When you use the RS Logix 5000 software to configure a ControlLogix digital I/O module, you must follow a standard set of procedures to:

- create a new module.
- choose default configuration for the module (each module has a default configuration specific to its capabilities) or write configuration specific to your application.
- edit configuration that has already been written for a module.

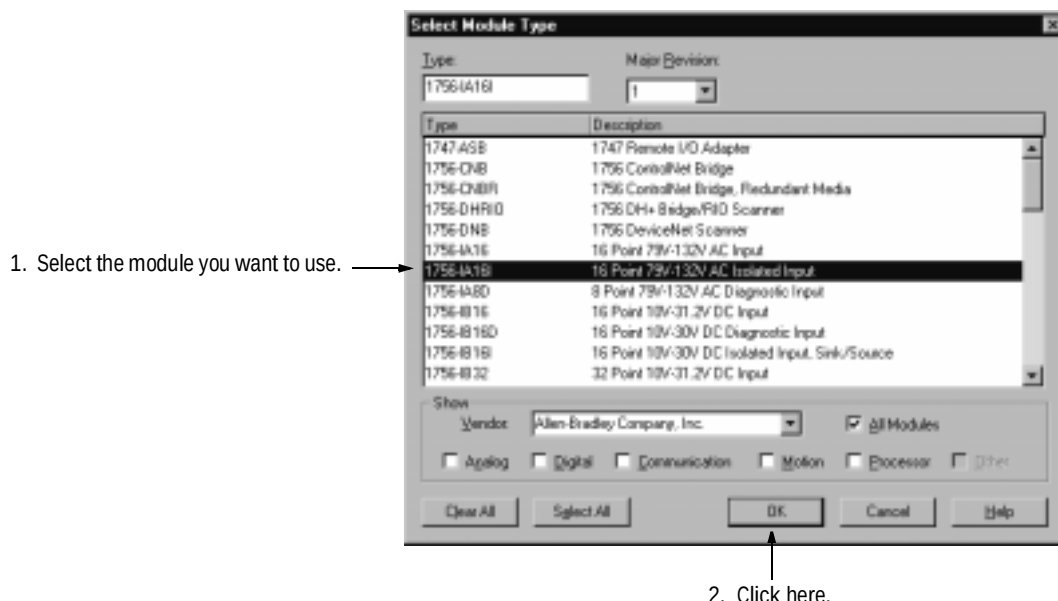
Creating a New Module

After you have started the RS Logix 5000 software and created a processor, you must create a new module. Use the screen and steps listed below to create a new module.



Selecting a Module

After creating a new module, the following screen appears. You must choose the specific type of new module you are using.



Using the Wizard to Write Configuration

RS Logix 5000 provides a wizard of screens that allow you to write configuration. You can use the default configuration or specific configuration for your application.

Regardless of which configuration you decide to use, you must enter the wizard on a naming page. You must:

- enter a name for your application
- choose a communications method - a detailed explanation of this feature is provided below.
- decide whether or not you want to use electronic keying - a detailed explanation of this feature is provided below.

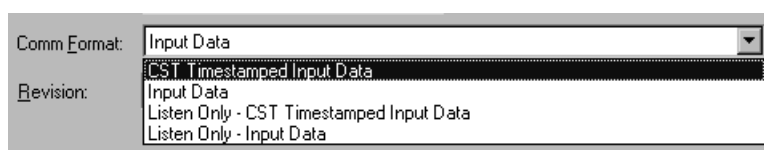
Communications Method

The communications method determines what type of configuration your module will use. This feature determines the connection between the controller writing the configuration and the module itself. There are generally four choices:

- owner controller
- owner controller with a timestamp on all data transmissions
- listen-only
- listen-only with a timestamp on all data transmissions

These are general definitions of the choices. Because each module has a list of specific choices available, depending upon factors such as input or output, diagnostic or Standard, the actual wording of these choices may vary slightly.

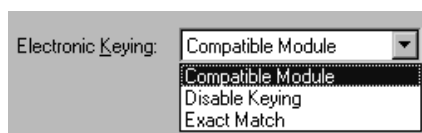
For example, the screen below shows the choices available when you are configuring a 1756-IA16I module.



Electronic Keying

When you write configuration for a module you can choose how specific the keying must be when a module is inserted into a slot in the chassis.

The screen below shows your options for electronic keying.



After you choose a module type, this screen appears.

The screenshot shows the 'Create Module' dialog box with the following fields and annotations:

- Type:** 1756-IA1B1 16 Point 75V-132V AC Isolated Input
- Vendor:** Allen-Bradley Company, Inc.
- Parent:** Local
- Name:** Sample_module (Annotation: Type a name.)
- Slot:** 1
- Description:** (Empty field)
- Comm Format:** Input Data (Annotation: Choose a communications format.)
- Revision:** 1
- Electronic Keying:** Disable Keying (Annotation: Choose what type of keying to use.)
- Buttons:** Cancel, < Back, Next >, Finish >>, Help

Annotations for the buttons:

- Next >:** If you are using application specific configuration, click here.
- Finish >>:** If you are using default configuration, click here.

Using the Default Configuration

If you use the default configuration and click on Finish, you are done.

Continuing with Specific Configuration

If you write specific configuration and click on Next, you will display a series of screens that enable you to configure various features of the module before finishing configuration.

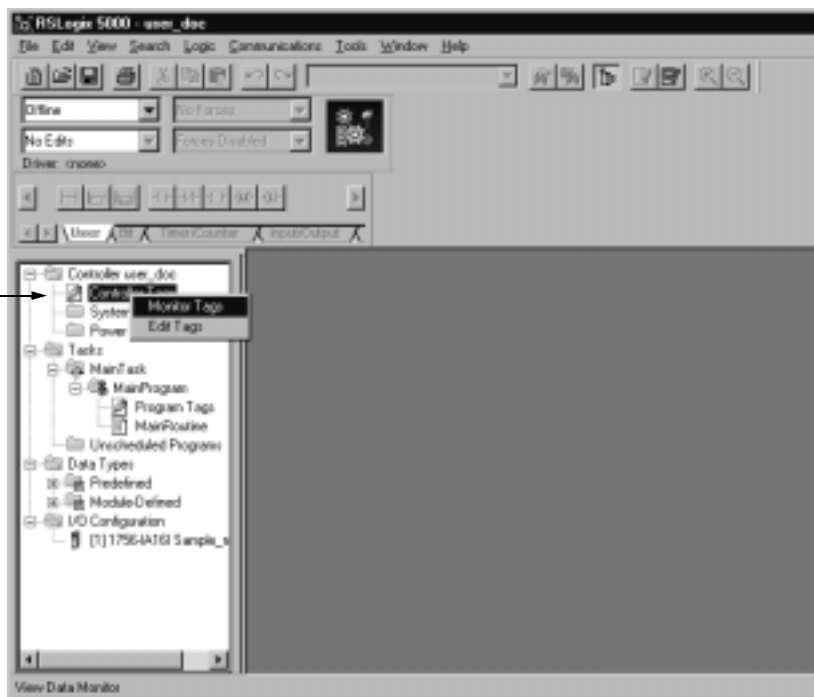
Note: Examples of these wizards screens for standard input and output modules and for diagnostic input and output modules are provided later in this chapter.

Viewing and Changing Module Tags

When you write configuration for a module, you establish a series of tags in the Tag Editor of RS Logix 5000. Each configurable feature on your module has a distinct tag in the processor's ladder logic. These tags allow you to change configuration during a process even if you do not have a PC available.

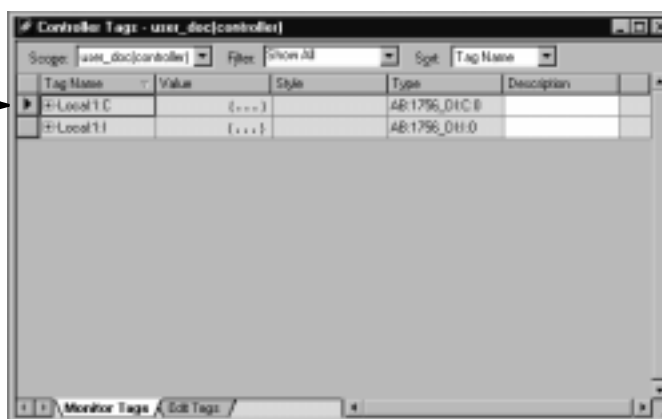
You can access a module's tags through RS Logix 5000 as shown below.

1. Select Controller Tags
2. Click on the right mouse button to display the menu
3. Select Monitor Tags



You can view and change all the tags from here.

Click on the slot number of the module you want to see.



Because the process of viewing and changing a module's configuration tags is broader in scope than can be addressed in this chapter, you must turn to Appendix A for more information and sample tag collections.

Viewing Common Configuration Screens

The following three screens appear in the same format for any ControlLogix digital I/O module's configuration.

Adjust the Requested Packet here.
Inhibit the Module here.

Requested Packet Interval: 5.0 ms

☐ Inhibit Module

☐ Major Fault on Controller if connection fails.

Fault

Cancel < Back Next > Finish >> Help

Click here to move to the next page.

Information on this page will vary with each module but the format will remain consistent regardless of which module you are using.

Identification:

Vendor:

Product Type:

Product Code:

Revision:

Serial Number:

Product Name:

Status:

Major Fault:

Minor Fault:

Internal State:

Configured:

Owned:

Module Identity:

Coordinated System Time (CST)

Timer Hardware:

Timer Sync'd:

Refresh Reset Module

Cancel < Back Next > Finish >> Help

Click here to move to the next page.

Information on this page will vary with each module but the format will remain consistent regardless of which module you are using.

ControlBus Status

Clear Fault

ControlBus Parameters

Multicast CRC Error Threshold:

Transmit Retry Limit:

Set Limit

Error Counters

Receive

Bad CRC:

Bus Timeout:

Multicast CRC Error

Transmit

Bad CRC:

Bus Timeout:

[Warning: Refreshing the page causes the module to clear its counters.] Refresh

Cancel < Back Next > Finish >> Help

Click here when you are finished configuring the module.

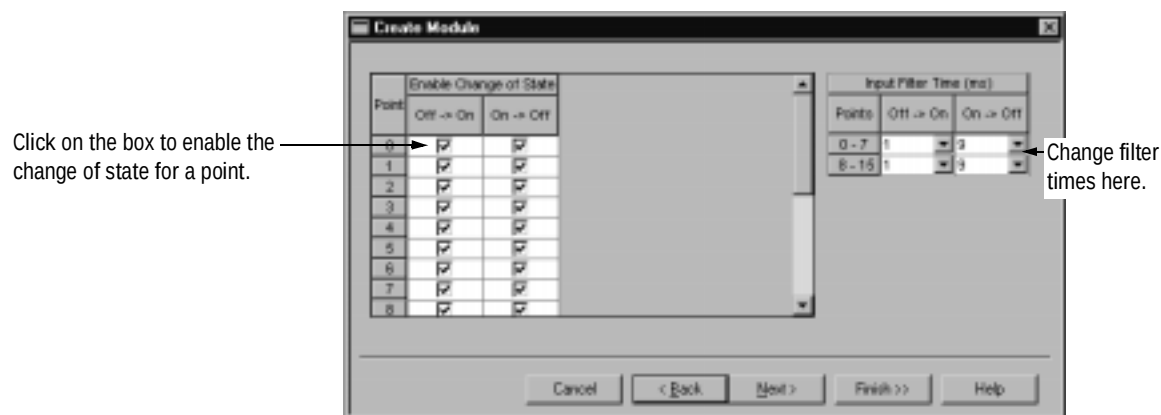
Configuring a Standard Input Module

The following ControlLogix digital input modules are standard input modules: 1756-IA16, IA16I, IB16, IB16I, IB32, IC16, IH16I, IM16I, IN16

The configurable features for a standard input module are:

- Change of State
- Input Filter Times.

Create a new module in RS Logix 5000 as described on page 4-6. Use the following page to configure your standard input module.



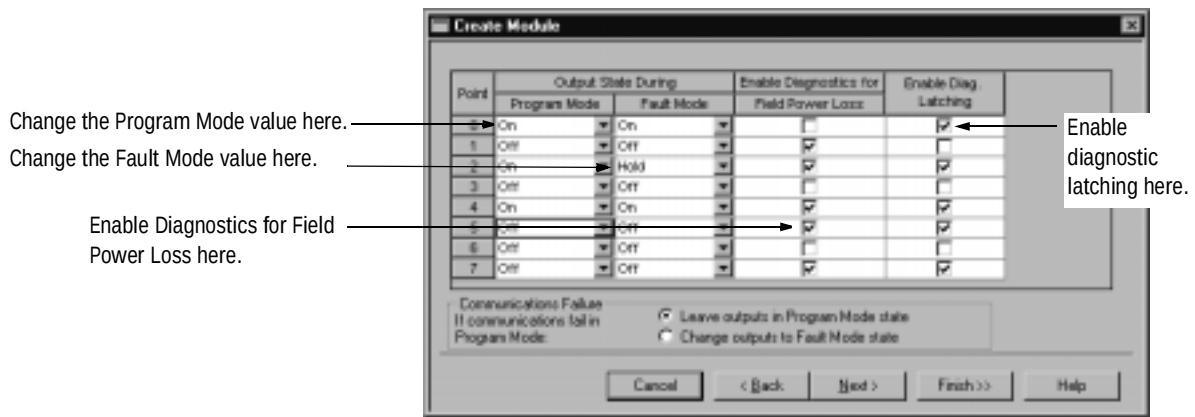
Configuring a Standard Output Module

The following ControlLogix digital output modules are standard output modules: 1756-OA16, OA16I, OA8, OA8E, OB16E, OB16I, OB32, OB8, OB8EI, OC8, OH8I, ON8, OW16I, OX8I

When you configure any of these modules, you will see the same series of screens in the RS Logix 5000 wizard. The configurable features for a standard output module are:

- Output State in Program Mode
- Output State in Fault Mode
- Transition from Program State to Fault State
- Loss of Field Power Detection - 1756-OA8E only
- Diagnostic Latching - 1756-OA8E only

Create a new module in RS Logix 5000 as described on page 4-6. Use the following page to configure your standard input module.



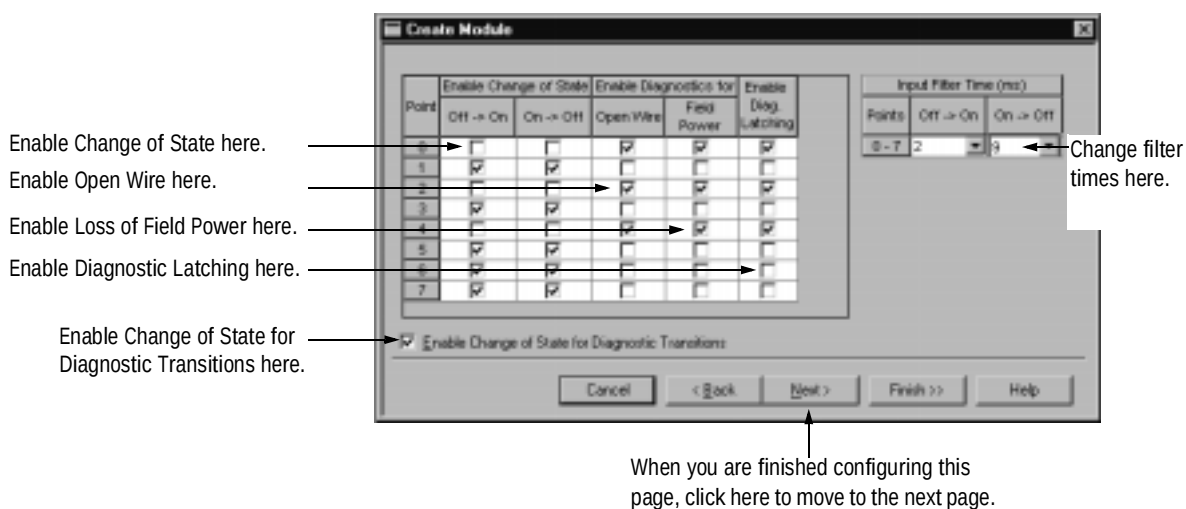
Configuring a Diagnostic Input Module

The following ControlLogix digital input modules are diagnostic input modules: 1756-IA8D and IB16D.

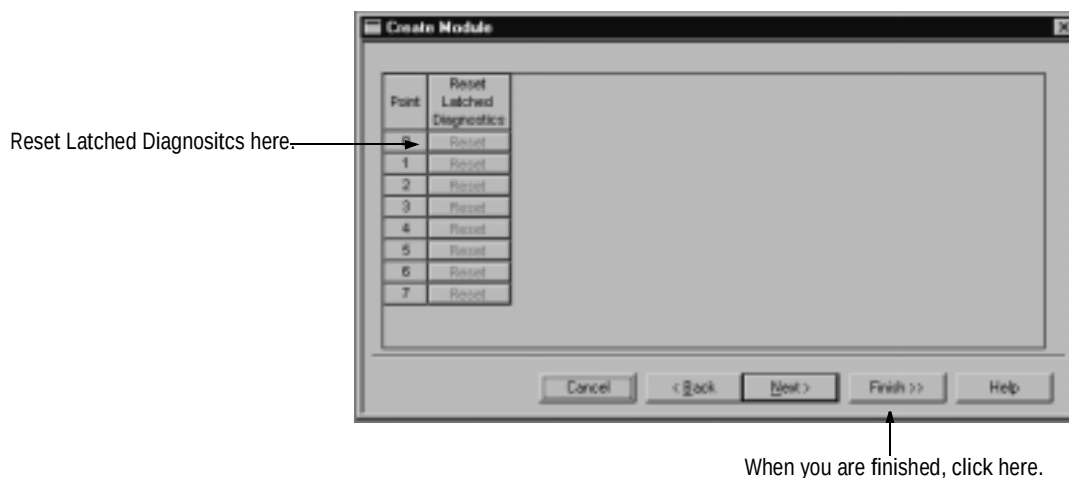
When you configure any of these modules, you will see the same series of screens in the RS Logix 5000 wizard. The configurable features for a diagnostic input module are:

- Change of State
- Input Filter Times
- Open Wire Detection
- Diagnostic Latching
- Diagnostic Change of State

Create a new module in RS Logix 5000 as described on page 4-6. Use the following pages to configure your diagnostic input module.



Diagnostic input modules have a second page of configurable features.



Configuring a Diagnostic Output Module

The following ControlLogix digital output modules are diagnostic input modules: 1756-OA8D and OB16D.

When you configure any of these modules, you will see the same series of screens in the RS Logix 5000 wizard. The configurable features for a diagnostic input module are:

- Output State in Program Mode
- Output State in Fault Mode
- Transition from Program State to Fault State
- Loss of Field Power Detection
- No Load Detection
- Output Verify Detection
- Diagnostic Latching

Create a new module in RS Logix 5000 as described on page 4-6. Use the following pages to configure your diagnostic output module.

Set the Program Mode value here.

Set the Fault Mode value here.

Enable Output Verify here.

Enable No Load here.

Choose Program Mode or Fault Mode for outputs if you have a communications failure in Program Mode here.

When you are finished configuring this page, click here to move to the next page.

Diagnostic output modules have a second page of configurable features.

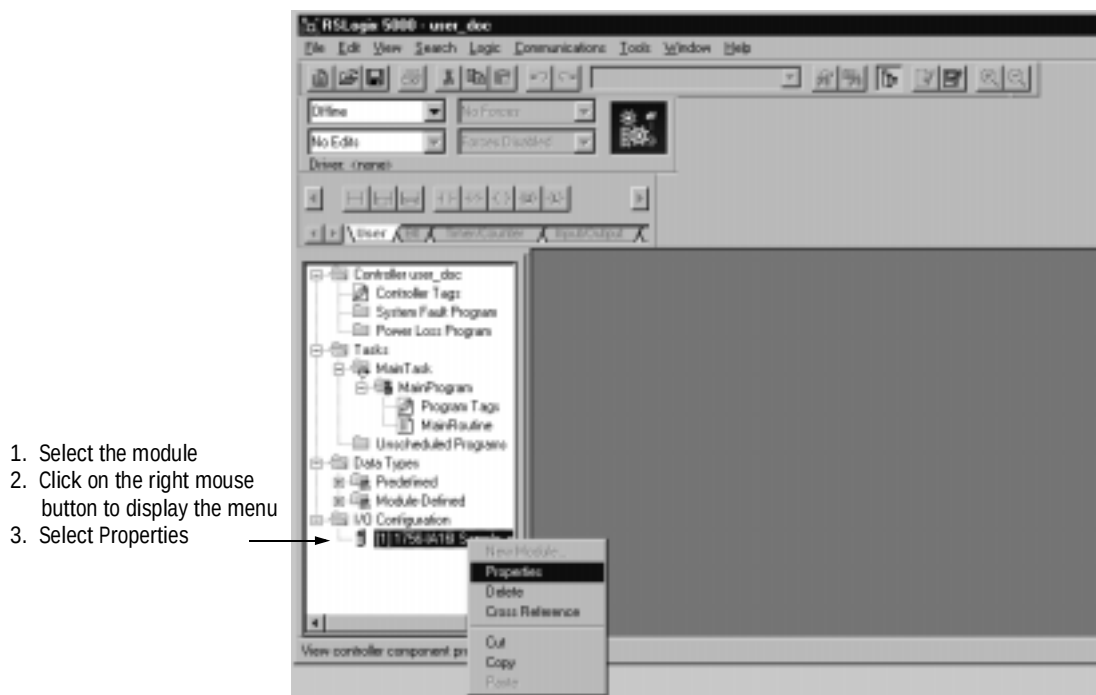
Reset Electronic Fuses here.

Reset Latched Diagnostics here.

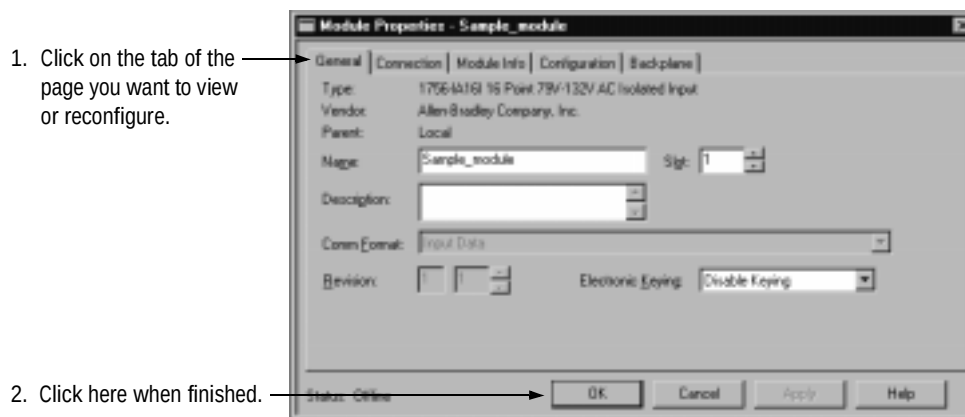
When you are finished, click here.

Editing Configuration

After you have written configuration for a module, you can view your choices and change them. The editing process begins on the main page of RS Logix 5000.



The properties of your module are comprised by this screen.



Chapter Summary and What's Next

In this chapter you learned about:

- configuring ControlLogix digital I/O modules
- configuration tags
- editing module configuration

Move on to Chapter 5 to understand troubleshooting your module.

Module Specific Information

What this Chapter Contains

This chapter provides module specific information for all ControlLogix digital modules. The information is separated by module and includes a list of configurable functions, wiring diagrams, LED indicators, simplified schematics and surge currents when applicable.

The following table lists where module specific information can be found:

For module:	Refer to:
1756-IA16	
1756-IA16I	
1756-IA8D	
1756-IB16	
1756-IB16D	
1756-IB16I	
1756-IB32	
1756-IC16	
1756-IH16I	
1756-IM16I	
1756-IN16	
1756-OA16	
1756-OA16I	
1756-OA8	
1756-OA8D	
1756-OA8E	
1756-OB16D	
1756-OB16E	
1756-OB16I	
1756-OB32	
1756-OB8	
1756-OB8EI	
1756-OC8	
1756-OH8I	
1756-ON8	
1756-OW16I	
1756-OX8I	

1756-IA16

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

Feature	Default value	Page of description
Communications method	Standard input	
Nondiagnostic change of state	OFF-ON: Enabled ON-OFF: Enabled	
Input filter time	OFF-ON: 1ms ON-OFF: 9ms	

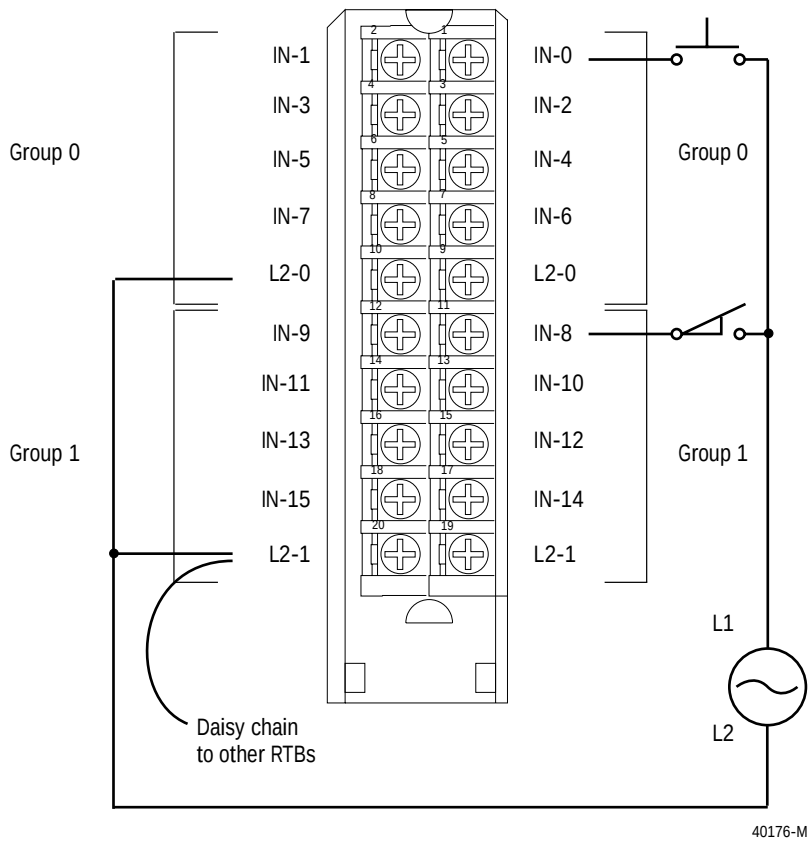
Wiring example

Use the following example to wire your module.

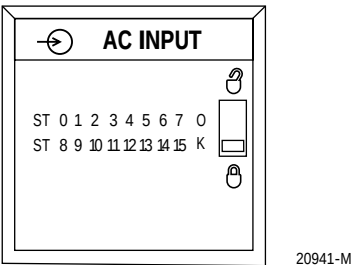
NOTES: All terminals with the same name are connected together on the module.
For example, L2 can be connected to any terminal marked L2-0

When you daisy chain from a group to another RTB, always connect the daisy chain to the terminal directly connected to the supply wire, as shown above.

This wiring example shows a single voltage source.



LED indicator



1756-IA16 Specifications

Number of Inputs	16 (8 points/common)
Module Location	1756 ControlLogix Chassis
Backplane Current	100mA @ 5.1V dc & 2mA @ 24V dc
Maximum Power Dissipation	5.4W @ 60°C
Thermal Dissipation	18.41 BTU/hr
On-State Voltage Range	79-132V ac, 47-63Hz
Nominal Input Voltage	120V ac
On-State Current	5mA @ 74V ac minimum 13mA @ 132V ac maximum
Maximum Off-State Voltage	20V
Maximum Off-State Current	2.5mA
Maximum Input Impedance @ 132V ac	10.15kΩ @ 60Hz
Input Delay Time	
Off to on	Programmable filter: 1ms & 2ms
Hardware delay	10ms maximum plus filter time
On to off	Programmable filter: 9ms & 18ms
Hardware delay	8ms maximum plus filter time
Diagnostic Functions	
Change of State	Software configurable
Time stamp of Inputs	+/- 200μs
Short/Inrush Current	250mA peak (decaying to <37% in 22ms, without activation)
Change of State on Inputs	Software configurable (Within 200μs)
Cyclic Update Time	User selectable (100μs minimum/750ms maximum)
Isolation Voltage	
Group to group	100% tested at 2546V dc for 1s
User to system	100% tested at 2546V dc for 1s
RTB Screw Torque (NEMA)	7-9 inch-pounds (0.8-1Nm)
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm	20 Position RTB (1756-TBNH or TBSH) ¹
Environmental Conditions	
Operating Temperature	0 to 60°C (32 to 140°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Relative Humidity	5 to 95% noncondensing
Conductors	
Wire Size	22-14 gauge (2mm ²) stranded ¹ 3/64 inch (1.2mm) insulation maximum
Category	1 ^{2,3}
Screwdriver Blade Width for RTB	5/16 inch (8mm) maximum
Agency Certification (when product or packaging is marked)	    Class I Div 2 Hazardous ⁴ Class I Div 2 Hazardous ⁴ marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-IA16I

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

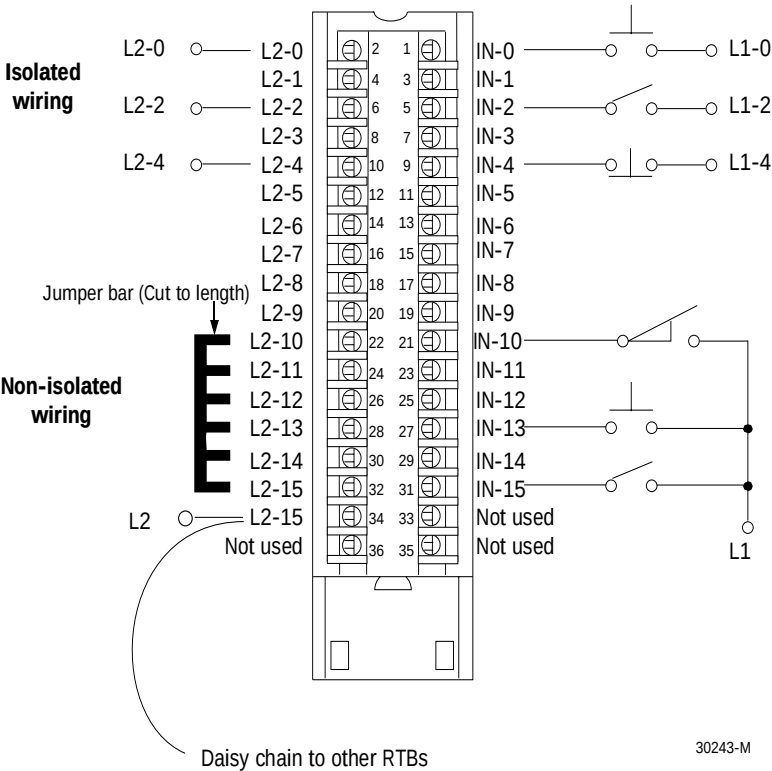
Feature	Default value	Page of description
Communications method	Standard input	
Nondiagnostic change of state	OFF-ON: Enabled ON-OFF: Enabled	
Input filter time	OFF-ON: 1ms ON-OFF: 9ms	

Wiring example

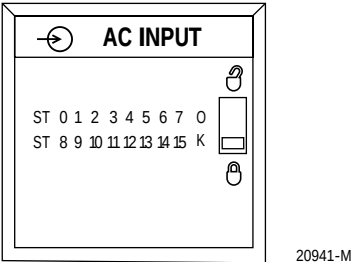
Use the following example to wire your module.

NOTES: All terminals with the same name are connected together on the module. For example, L2 can be connected to any terminal marked L2-15.

When you use the second L2-15 terminal to daisy chain to other RTBs, always connect the daisy chain to the terminal directly connected to the supply wire, as shown in the example above.



LED indicator



1756-IA16I Specifications

Number of Inputs	16 (individually isolated)
Module Location	1756 ControlLogix Chassis
Backplane Current	70mA @ 5.1V dc & 3mA @ 24V dc
Maximum Power Dissipation	4.9W @ 60°C
Thermal Dissipation	16.71 BTU/hr
On-State Voltage Range	79-132V ac, 47-63Hz
Nominal Input Voltage	120V ac
On-State Current	5mA @ 79V ac, 47-63Hz minimum 15mA @ 132 V ac, 47-63Hz, maximum
Maximum Off-State Voltage	20V ac
Maximum Off-State Current	2.5mA
Maximum Input Impedance @ 132V ac	8.8kΩ @ 60Hz
Input Delay Time	
Off to on	Programmable filter: 1ms & 2ms
Hardware delay	10ms maximum plus filter time
On to off	Programmable filter: 9ms & 18ms
Hardware delay	8ms maximum plus filter time
Diagnostic Functions	
Change of state	Software configurable
Time stamp of inputs	+/- 200μs
Short/Inrush Current	250 mA peak (decaying to <37% in 22 ms, without activation)
Cyclic Update Time	User selectable (100μs minimum/750ms maximum)
Isolation Voltage	
Channel to channel	100% tested at 2546V dc for 1s
User to system	100% tested at 2546V dc for 1s
RTB Screw Torque (Cage clamp)	4.4 inch-pounds (0.4Nm) maximum
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm	36 Position RTB (1756-TBCH or TBS6H) ¹
Environmental Conditions	
Operating Temperature	0 to 60°C (32 to 140°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Relative Humidity	5 to 95% noncondensing
Conductors	
Wire Size	22–14 gauge (2mm ²) stranded ¹
Category	3/64 inch (1.2mm) insulation maximum ^{1,2,3}
Screwdriver Blade Width for RTB	1/8 inch (3.2mm) maximum
Agency Certification (when product or packaging is marked)	    Class I Div 2 Hazardous ⁴ Class I Div 2 Hazardous ⁴ marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-IA8D**Configurable features**

The following table lists the configurable features this module supports, the default value and the page of the feature's description:

Feature	Default value	Page of description
Communications method	Standard input	
Diagnostic change of state	Disabled	
Open wire	Enabled	
Field power loss	Enabled	
Diagnostic latch	Enabled	
Nondiagnostic change of state	OFF-ON: Enabled ON-OFF: Enabled	
Input filter time	OFF-ON: 1ms ON-OFF: 9ms	

Wiring example

Use the following example to wire your module.

NOTES: All terminals with the same name are connected together on the module. For example, L2 can be connected to any terminal marked L2-0.

This wiring example shows a single voltage source.

When you daisy chain from a group to other RTBs, always connect the daisy chain to the terminal directly connected to the supply wire, as shown above.

Resistors are not necessary if Wire Off diagnostic is not used.

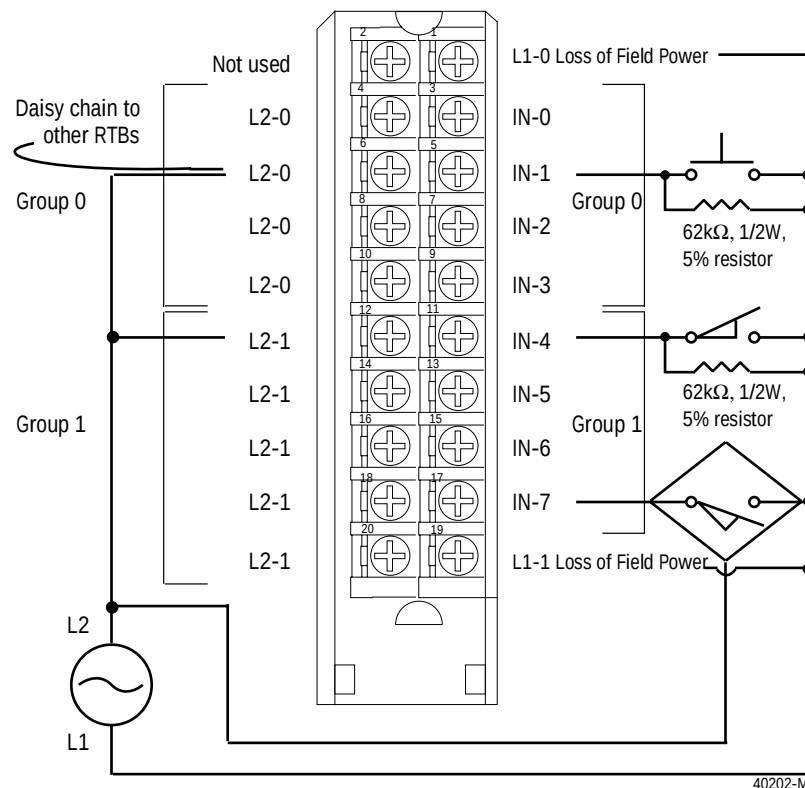
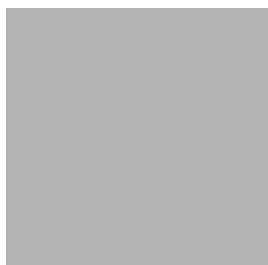
To Determine Leakage Resistor

$$R_{LEAK} \text{ Maximum} = (P/S \text{ Voltage} - 19V \text{ ac}) / 1.5mA$$

$$R_{LEAK} \text{ Minimum} = P/S \text{ Voltage} / 2.5mA$$

Recommended Values

P/S Voltage	R_{LEAK} , 1/2W, 5%
74V ac	33k Ω
100V ac	51k Ω
120V ac	62k Ω
132V ac	68k Ω

**LED indicator**

20927-M

1756-IA8D Specifications

Number of Inputs	8 (4 points/common)
Module Location	1756 ControlLogix Chassis
Backplane Current	70mA @ 5.1V dc & 3mA @ 24V dc
Maximum Power Dissipation	4.5W @ 60°C
Thermal Dissipation	15.35 BTU/hr
On-State Voltage Range	79-132V ac, 47-63Hz
Nominal Input Voltage	120V ac
On-State Current	74V @ 5mA ac, 47-63Hz minimum 16mA @ 132V ac, 47-63Hz maximum
Maximum Off-State Voltage	20V
Maximum Off-State Current	2.5mA
Maximum Input Impedance @ 132V ac	8.25k Ω @ 60Hz
Input Delay Time	
Off to on	Programmable filter: 1ms & 2ms
Hardware Delay	10ms maximum plus filter time
On to Off	Programmable filter: 9ms & 18ms
Hardware Delay	8ms maximum plus filter time
Diagnostic Functions	
Open Wire	Off state leakage current 1.5mA minimum
Loss of Power	Transition range 46 to 85V ac
Time Stamp of Diagnostics	+/- 1ms
Change of State	Software configurable
Time stamp of Inputs	+/- 200 μ s
Short/Inrush Current	250mA peak (decaying to <37% in 22ms, without activation)
Cyclic Update Time	User Selectable (100 μ s minimum/750ms maximum)
Isolation Voltage	
Group to group	100% tested at 2546V dc for 1s
User to system	100% tested at 2546V dc for 1s
RTB Screw Torque (NEMA)	7-9 inch-pounds (0.8-1Nm)
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm and Housing	20 Position RTB (1756-TBNH or TBSH) ¹
Environmental Conditions	
Operating Temperature	0 to 60°C (32 to 140°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Relative Humidity	5 to 95% noncondensing
Conductors	
Wire Size	22-14 gauge (2mm ²) stranded ¹ 3/64 inch (1.2mm) insulation maximum
Category	1 ^{2,3}
Screwdriver Width for RTB	5/16 inch (8mm) maximum
Agency Certification (when product or packaging is marked)	    Class I Div 2 Hazardous ⁴ Class I Div 2 Hazardous ⁴ marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-IB16

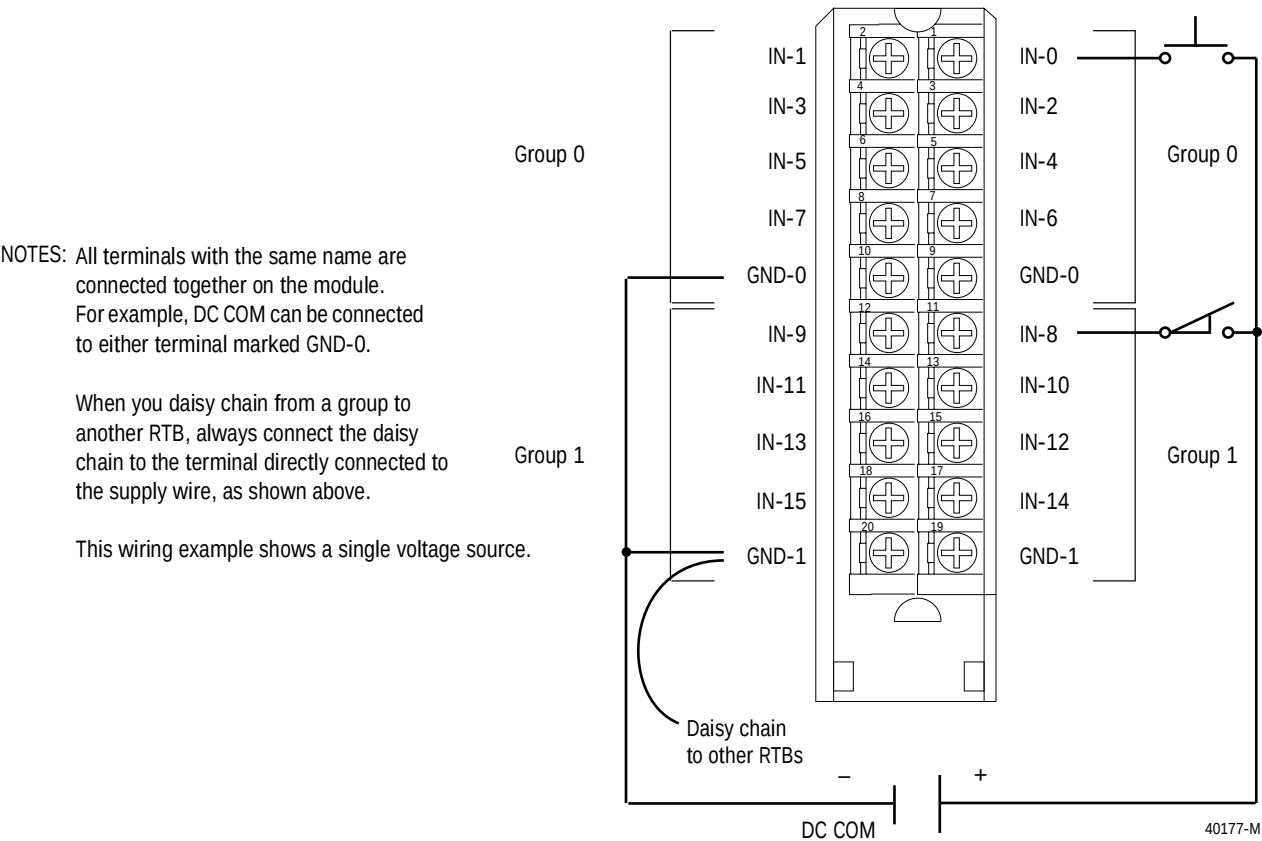
Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

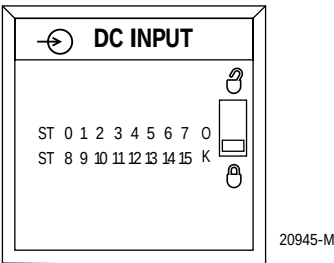
Feature	Default value	Page of description
Communications method	Standard input	
Nondiagnostic change of state	OFF-ON: Enabled ON-OFF: Enabled	
Input filter time	OFF-ON: 1ms ON-OFF: 1ms	

Wiring example

Use the following example to wire your module.



LED indicator



1756-IB16 Specifications

Number of Inputs	16 (8 points/common)
Module Location	1756 ControlLogix Chassis
Backplane Current	100mA @ 5.1V dc & 2mA @ 24V dc
Maximum Power Dissipation	5.1W @ 60°C
Thermal Dissipation	17.39 BTU/hr
On-State Voltage Range	10-31.2V dc
Nominal Input Voltage	24V dc
On-State Current	2.0mA @ 10V dc minimum 10mA @ 31.2V dc maximum
Maximum Off-State Voltage	5V
Maximum Off-State Current	1.5mA
Maximum Input Impedance @ 31.2V dc	3.12k Ω
Input Delay Time	
Off to on	Programmable filter: 0ms, 1ms or 2ms
Hardware delay	1ms maximum plus filter time
On to off	Programmable filter: 0ms, 1ms, 2ms, 9ms or 18ms
Hardware delay	2ms maximum plus filter time
Diagnostic Functions	
Change of State	Software configurable
Time Stamp of Inputs	+/- 200 μ s
Short/Inrush Current	250mA peak (decaying to <37% in 22ms, without activation)
Cyclic Update Time	User selectable (100 μ s minimum/750ms maximum)
Reverse Polarity Protection	Yes
Isolation Voltage	
Group to group	100% tested at 2546V dc for 1s
User to system	100% tested at 2546V dc for 1s
RTB Screw Torque (NEMA clamp)	7-9 inch-pounds (0.8-1Nm)
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm	20 Position RTB (1756-TBNH or TBSH) ¹
Environmental Conditions	
Operating Temperature	0 to 60°C (32 to 140°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Relative Humidity	5 to 95% noncondensing
Conductors	
Wire Size	22-14 gauge (2mm ²) stranded ¹
Category	3/64 inch (1.2mm) insulation maximum 1 ^{2,3}
Screwdriver Blade Width for RTB	5/16 inch (8mm) maximum
Agency Certification (when product or packaging is marked)	 Class I Div 2 Hazardous ⁴  Class I Div 2 Hazardous ⁴  marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-IB16D

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature's description:

Feature	Default value	Page of description
Communications method	Standard input	
Diagnostic change of state	Disabled	
Open wire	Enabled	
Field power loss	Channels 0-7: Disabled Channels 8-15: Disabled	
Diagnostic latch	Enabled	
Nondiagnostic change of state	OFF-ON: Enabled ON-OFF: Enabled	
Input filter time	OFF-ON: 1ms ON-OFF: 1ms	

Wiring example

Use the following example to wire your module.

NOTES: All terminals with the same name are connected together on the module.

For example, DC COM can be connected to any terminal marked GND-0.

When you daisy chain from a group to other RTBs, always connect the daisy chain to the terminal directly connected to the supply wire, as shown above.

This wiring example shows a single voltage source.

Resistors are not necessary if Wire Off diagnostic is not used.

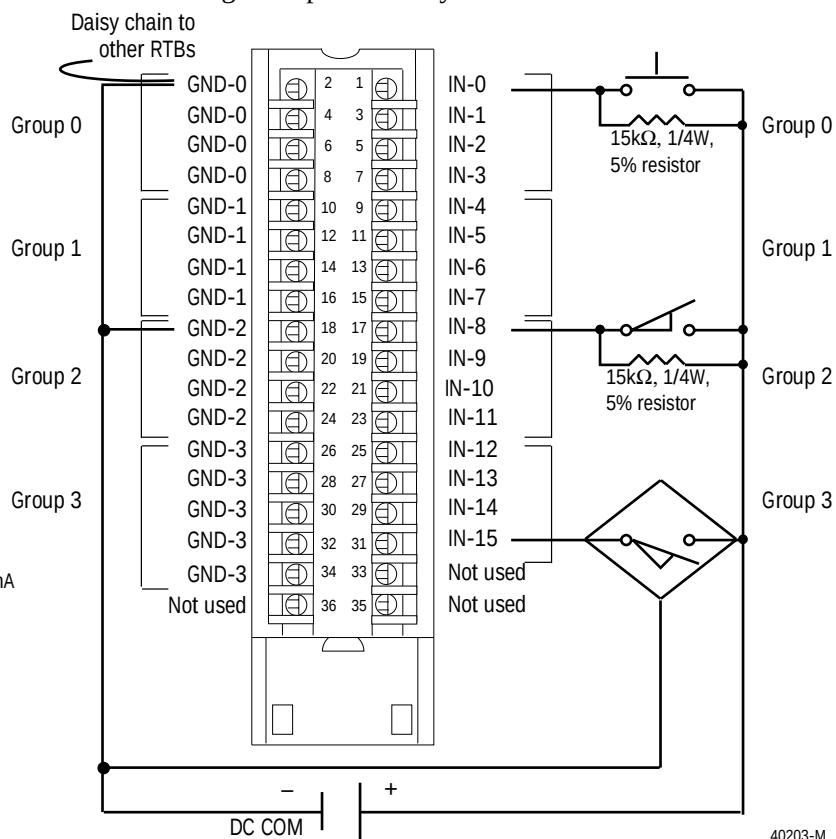
To Determine Leakage Resistor

$$R_{LEAK\text{Maximum}} = (P/S \text{ Voltage} - 4.6V \text{ dc}) / 1.21mA$$

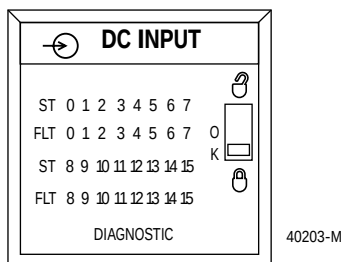
$$R_{LEAK\text{Minimum}} = (P/S \text{ Voltage} - 5V \text{ dc}) / 2.5mA$$

Recommended Values

P/S Voltage	R_{LEAK} , 1/4W, 5%
10V dc	3.9k Ω
12V dc	5.6k Ω
12V dc	15k Ω
30V dc	18k Ω



LED indicator



1756-IB16D Specifications

Number of Inputs	16 (4 points/common)
Module Location	1756 ControlLogix Chassis
Backplane Current	90mA @ 5.1V dc & 3mA @ 24V dc
Maximum Power Dissipation	5.8W @ 60°C
Thermal Dissipation	19.78 BTU/hr
On-State Voltage Range	10-30V dc
Nominal Input Voltage	24V dc
On-State Current	2mA @ 10V dc minimum 13mA @ 30V dc maximum
Maximum Off-State Voltage	5V dc
Minimum Off-State Current	1.5mA per point
Maximum Input Impedance @ 30V dc	2.31k Ω
Input Delay Time Off to on Hardware On to off Hardware delay	Programmable filter: 0ms, 1ms & 2ms 1ms maximum plus filter time Programmable filter: 0ms, 1ms, 9ms & 18ms 4ms maximum plus filter time
Diagnostic Functions Open wire Time stamp of diagnostics Change of state Time stamp on inputs	Off-state leakage current 1.2mA minimum +/- 1ms Software configurable +/- 200 μ s
Short/Inrush Current	250mA peak (decaying to <37% in 22ms, without activation)
Cyclic Update Time	User selectable (100 μ s minimum/750ms maximum)
Reverse Polarity Protection	Yes
Isolation Voltage Group to group User to system	100% tested at 2546V dc for 1s 100% tested at 2546V dc for 1s
RTB Screw Torque (Cage clamp)	4.4 inch-pounds (0.4Nm) maximum
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm and Housing	36 Position RTB (1756-TBCH or TBS6H) ¹
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing
Conductors Wire Size Category	22-14 gauge (2mm ²) stranded ¹ 3/64 inch (1.2mm) insulation maximum 1 ^{2,3}
Screwdriver Blade Width for RTB	1/8 inch (3.2mm) maximum
Agency Certification (when product or packaging is marked)	    Class I Div 2 Hazardous ⁴ Class I Div 2 Hazardous ⁴ marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-IB16I

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

Feature	Default value	Page of description
Communications method	Standard input	
Nondiagnostic change of state	OFF-ON: Enabled ON-OFF: Enabled	
Input filter time	OFF-ON: 1ms ON-OFF: 1ms	

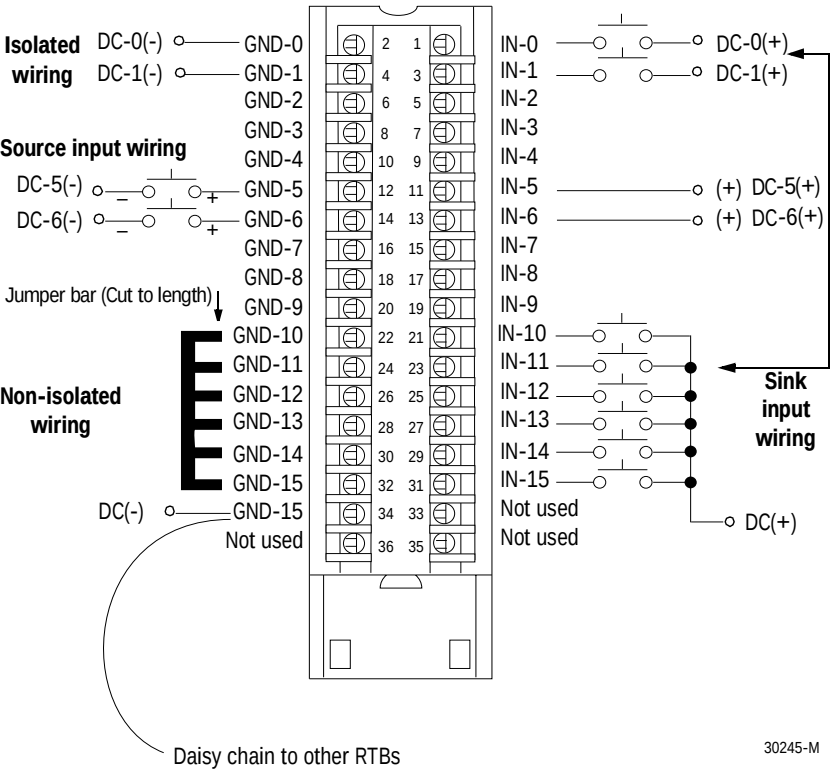
Wiring example

Use the following example to wire your module.

NOTES: All terminals with the same name are connected together on the module . For example, DC(-) can be connected to either terminal marked GND-15.

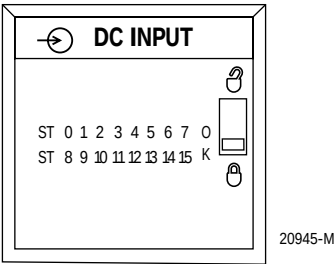
When you use the second GND-15 terminal to daisy chain to other RTBs, always connect the daisy chain to the terminal directly connected to the supply wire, as shown in the example above.

Each input can be wired in a sink or source configuration, as shown above.



30245-M

LED indicator



1756-IB16I Specifications

Number of Inputs	16 (individually isolated)
Module Location	1756 ControlLogix Chassis
Backplane Current	75mA @ 5.1V dc & 3mA @ 24V dc
Maximum Power Dissipation	5W @ 60°C
Thermal Dissipation	17.05 BTU/hr
On-State Voltage Range	10-30V dc
Nominal Input Voltage	24V dc
On-State Current	2mA @ 10V dc minimum 10mA @ 30 V dc maximum
Maximum Off-State Voltage	5V dc
Maximum Off-State Current	1.5mA
Maximum Input Impedance @ 30V dc	3kΩ @ 60Hz
Input Delay Time	
Off to on	Programmable filter: 0ms, 1ms or 2ms
Hardware delay	1ms maximum plus filter time
On to off	Programmable filter: 0ms, 1ms, 2ms, 9ms or 18ms
Hardware delay	4ms maximum plus filter time
Diagnostic Functions	
Change of state	Software configurable
Time stamp of inputs	+/- 200μs
Short/Inrush Current	250mA peak (decaying to <37% in 22 ms, without activation)
Cyclic Update Time	User selectable (100μs minimum/750ms maximum)
Reverse Polarity Protection	Yes
Isolation Voltage	
Channel to channel	100% tested at 2546V dc for 1s
User to system	100% tested at 2546V dc for 1s
RTB Screw Torque (Cage clamp)	4.4 inch-pounds (0.4Nm) maximum
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm	36 Position RTB (1756-TBCH or TBS6H) ¹
Environmental Conditions	
Operating Temperature	0 to 60°C (32 to 140°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Relative Humidity	5 to 95% noncondensing
Conductors	
Wire Size	22-14 gauge (2mm ²) stranded ¹
Category	3/64 inch (1.2mm) insulation maximum 1 ^{2,3}
Screwdriver Blade Width for RTB	1/8 inch (3.2mm) maximum
Agency Certification (when product or packaging is marked)	    Class I Div 2 Hazardous ⁴ Class I Div 2 Hazardous ⁴ marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-IB32

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

Feature	Default value	Page of description
Communications method	Standard input	
Nondiagnostic change of state	OFF-ON: Enabled ON-OFF: Enabled	
Input filter time	OFF-ON: 1ms ON-OFF: 1ms	

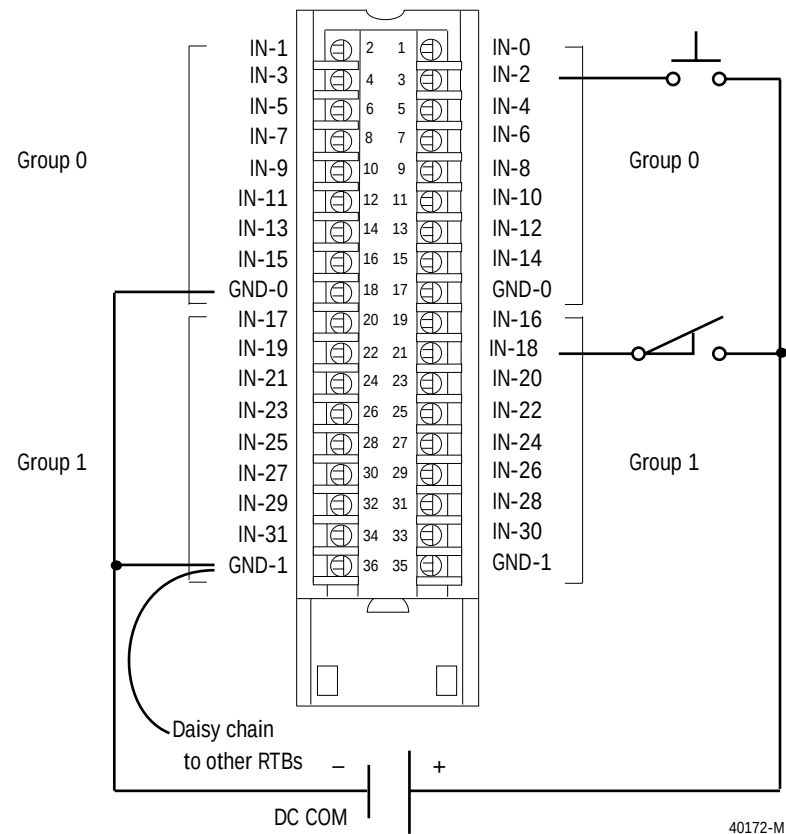
Wiring example

Use the following example to wire your module.

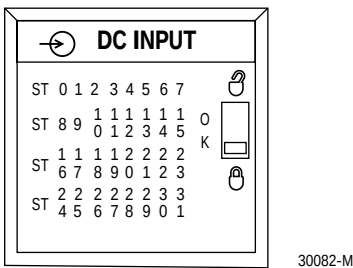
NOTES: All terminals with the same name are connected together on the module.
For example, DC COM can be connected to either terminal marked GND-1.

When you daisy chain to other RTBs, always connect the daisy chain to the terminal directly connected to the supply wire, as shown in the example above.

This wiring example shows a single voltage source.



LED indicator



1756-IB32 Specifications

Number of Inputs	32 (16 points/common)
Module Location	1756 ControlLogix Chassis
Backplane Current	150mA @ 5.1V dc & 2mA @ 24V dc
Maximum Power Dissipation	4.5W @ 60°C
Thermal Dissipation	16.37 BTU/hr @ 60°C
On-State Voltage Range	10-31.2V dc
Nominal Input Voltage	24V dc
On-State Current	2mA @ 10V dc minimum 5.5 mA @ 31.2V dc maximum
Maximum Off-State Voltage	5V dc
Maximum Off-State Current	1.5mA
Maximum Input Impedance @ 31.2V dc	5.67k Ω
Input Delay Time	
Off to on	Programmable filter: 0ms, 1ms or 2ms
Hardware delay	1ms maximum plus filter time
On to off	Programmable filter: 0ms, 1ms, 2ms, 9ms or 18ms
Hardware delay	2ms maximum plus filter time
Diagnostic Functions	
Change of state	Software configurable
Time stamp on inputs	+/- 200 μ s
Short/Inrush Current	250mA peak (decaying to <37% in 22ms, without activation)
Cyclic Update Time	User selectable (100 μ s minimum/750ms maximum)
Reverse Polarity Protection	Yes
Isolation Voltage	
Group to group	100% tested at 2546V dc for 1s
User to system	100% tested at 2546V dc for 1s
RTB Screw Torque (Cage clamp)	4.4 inch-pounds (0.4Nm) maximum
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm and Housing	36 Position RTB (1756-TBCH or TBS6H) ¹
Environmental Conditions	
Operating Temperature	0 to 60°C (32 to 140°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Relative Humidity	5 to 95% noncondensing
Conductors	
Wire Size	22-14 gauge (2mm ²) stranded ¹
Category	3/64 inch (1.2mm) insulation maximum 1 ^{2,3}
Screwdriver Blade Width for RTB	1/8 inch (3.2mm) maximum
Agency Certification (when product or packaging is marked)	 Class I Div 2 Hazardous ⁴  Class I Div 2 Hazardous ⁴  marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-IC16

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

Feature	Default value	Page of description
Communications method	Standard input	
Nondiagnostic change of state	OFF-ON: Enabled ON-OFF: Enabled	
Input filter time	OFF-ON: 1ms ON-OFF: 1ms	

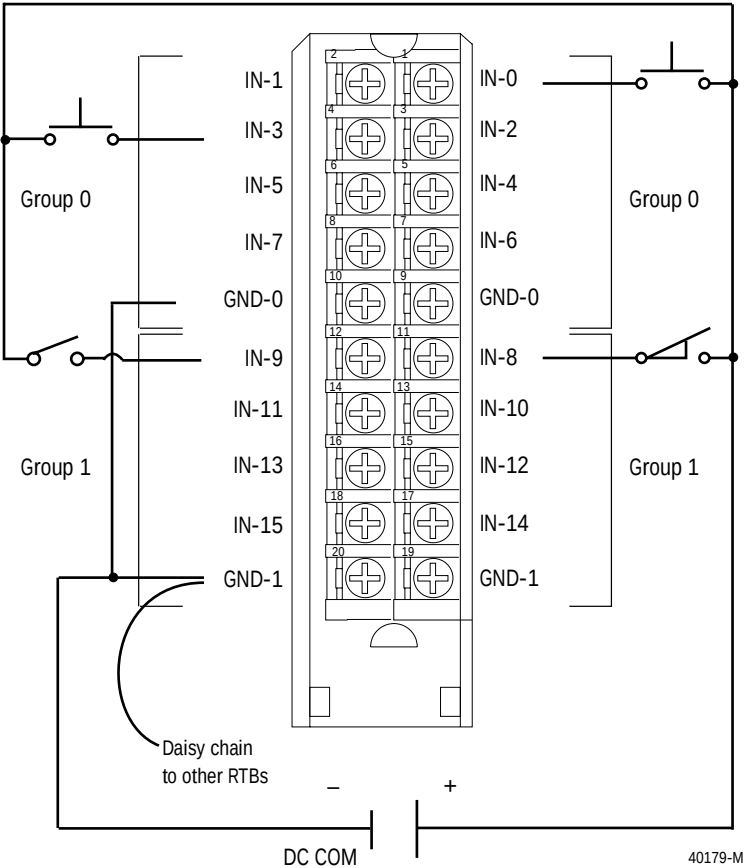
Wiring example

Use the following example to wire your module.

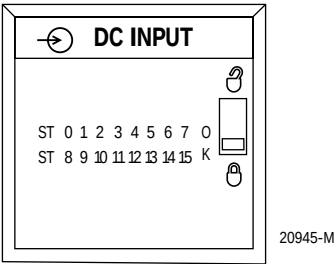
NOTES: All terminals with the same name are connected together on the module. For example, DC COM can be connected to any terminal marked GND-1.

When you daisy chain from a group to another RTB, always connect the daisy chain to the terminal directly connected to the supply wire, as shown above.

This wiring example shows a single voltage source.



LED indicator



1756-IC16 Specifications

Number of Inputs	16 (8 points/common)
Module Location	1756 ControlLogix Chassis
Backplane Current	80mA @ 5.1V dc & 3mA @ 24V dc
Maximum Power Dissipation	5.2W @ 60°C
Thermal Dissipation	17.73 BTU/hr
On-State Voltage Range	30-55V dc @ 60°C all channels (Linear derating) 30-60V dc @ 55°C all channels (Linear derating)
Nominal Input Voltage	48V dc
On-State Current	2mA @ 30V dc minimum 7mA @ 60V dc maximum
Maximum Off-State Voltage	10V
Maximum Off-State Current	1.5mA
Maximum Input Impedance @ 60V dc	8.57k Ω
Input Delay Time Off to on Hardware delay On to off Hardware delay	Programmable filter: 0ms, 1ms, or 2ms 1ms maximum plus filter time Programmable filter: 0ms, 1ms, 2ms, 9ms, or 18ms 4ms maximum plus filter time
Diagnostic Functions Change of state Time stamp of inputs	Software configurable +/- 200 μ s
Short/Inrush Current	250mA peak (decaying to <37% in 22 ms, without activation)
Cyclic Update Time	User selectable (100 μ s minimum/750ms maximum)
Reverse Polarity Protection	Yes
Isolation Voltage Group to group User to system	100% tested at 2546V dc for 1s 100% tested at 2546V dc for 1s
RTB Screw Torque (NEMA)	7-9 inch-pounds (0.8-1Nm)
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm	20 Position RTB (1756-TBNH or TBSH) ¹
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing
Conductors Wire Size Category	22-14 gauge (2mm ²) stranded ¹ 3/64 inch (1.2mm) insulation maximum 1 ^{2,3}
Screwdriver Blade Width for RTB	5/16 inch (8mm) maximum
Agency Certification (when product or packaging is marked)	    Class I Div 2 Hazardous ⁴ Class I Div 2 Hazardous ⁴ marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-IH16I

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

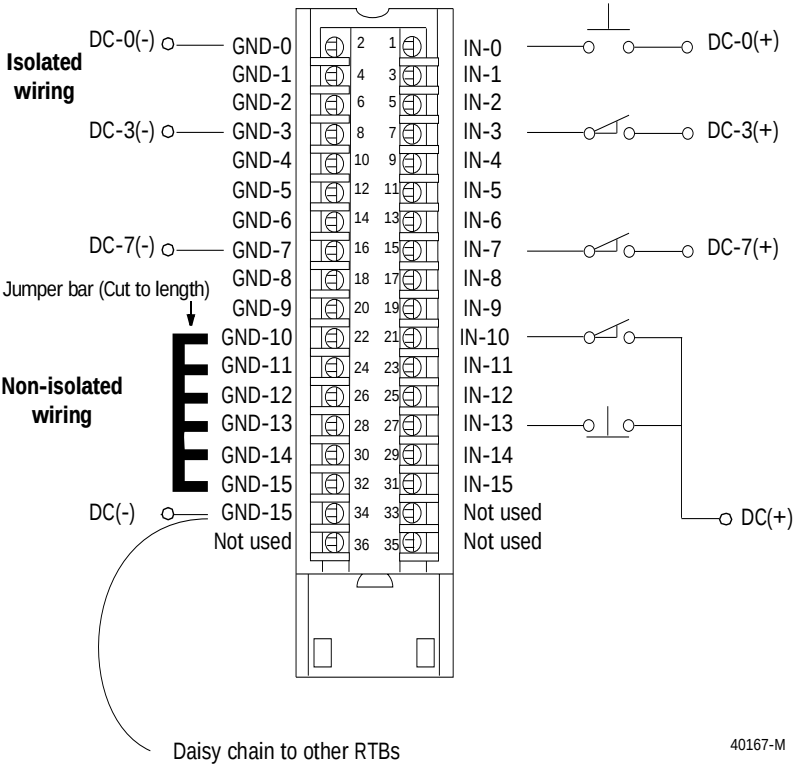
Feature	Default value	Page of description
Communications method	Standard input	
Nondiagnostic change of state	OFF-ON: Enabled ON-OFF: Enabled	
Input filter time	OFF-ON: 1ms ON-OFF: 1ms	

Wiring example

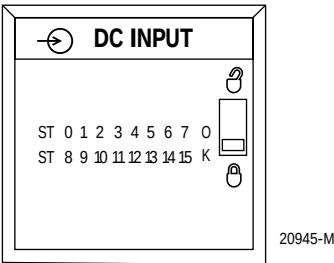
Use the following example to wire your module.

NOTES: All terminals with the same name are connected together on the module.
For example, DC(-) can be connected to either terminal marked GND-15.

When you use the second GND-15 terminal to daisy chain to other RTBs, always connect the daisy chain to the terminal directly connected to the supply wire, as shown in the example above.



LED indicator



1756-IH16I Specifications

Number of Inputs	16 (Individually isolated)
Module Location	1756 ControlLogix Chassis
Backplane Current	75mA @ 5.1V dc & 3mA @ 24V dc
Maximum Power Dissipation	5W @ 60°C
Thermal Dissipation	17.05 BTU/hr
On-State Voltage Range Derated as follows	90-146V dc 90-146V dc @ 50°C, 12 Channels ON @ same time 90-132V dc @ 55°C, 14 Channels ON @ same time 90-125V dc @ 60°C, 16 Channels ON @ same time 90-146V dc @ 30°C, 16 Channels ON @ same time
Nominal Input Voltage	125V dc
On-State Current	1mA @ 90V dc minimum 3mA @ 146V dc maximum
Maximum Off-State Voltage	20V dc
Maximum Off-State Current	0.8mA
Maximum Input Impedance @ 146V dc	48.67kΩ
Input Delay Time Off to on Hardware delay On to off Hardware delay	Programmable filter: 0ms, 1ms or 2ms 2ms maximum plus filter time Programmable filter: 0ms, 1ms, 2ms, 9ms or 18ms 6ms maximum plus filter time
Diagnostic Functions Change of state Time stamp of inputs	Software configurable +/- 200μs
Short/Inrush Current	250mA peak (decaying to <37% in 22ms, without activation)
Cyclic Update Time	User selectable (100μs minimum/750ms maximum)
Reverse Polarity Protection	Yes
Isolation Voltage Channel to channel User to system	100% tested at 2546V dc for 1s 100% tested at 2546V dc for 1s
RTB Screw Torque (Cage clamp)	4.4 inch-pounds (0.4Nm) maximum
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm	36 Position RTB (1756-TBCH or TBS6H) ¹
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing
Conductors Wire Size Category	22-14 gauge (2mm ²) stranded ¹ 3/64 inch (1.2mm) insulation maximum 1 ^{2,3}
Screwdriver Blade Width for RTB	1/8 inch (3.2mm) maximum
Agency Certification (when product or packaging is marked)	 Class I Div 2 Hazardous ⁴  Class I Div 2 Hazardous ⁴  marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-IM16I

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

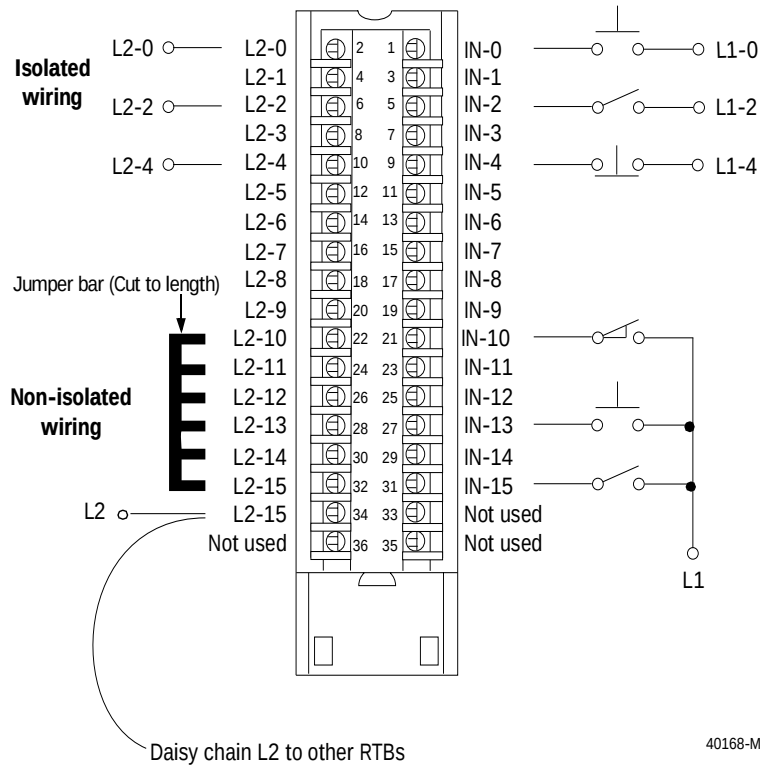
Feature	Default value	Page of description
Communications method	Standard input	
Nondiagnostic change of state	OFF-ON: Enabled ON-OFF: Enabled	
Input filter time	OFF-ON: 1ms ON-OFF: 1ms	

Wiring example

Use the following example to wire your module.

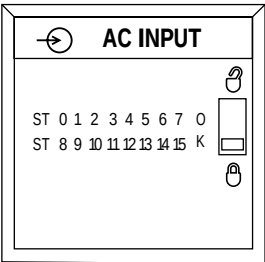
NOTES: All terminals with the same name are connected together on the module. For example, L2 can be connected to any terminal marked L2-15.

When you use the second L2-15 terminal to daisy chain to other RTBs, always connect the daisy chain to the terminal directly connected to the supply wire, as shown in the example above.



40168-M

LED indicator



20941-M

1756-IM16I Specifications

Number of Inputs	16 (Individually isolated)
Module Location	1756 ControlLogix Chassis
Backplane Current	70mA @ 5.1V dc & 3mA @ 24V dc
Maximum Power Dissipation	5.8W @ 60°C
Thermal Dissipation	19.78 BTU/hr
On-State Voltage Range	159-265V ac, 47-63Hz @ 30°C All Channels ON 159-265V ac, 47-63Hz @ 40°C 8 Points ON 159-253V ac, 47-63Hz @ 45°C All Channels ON 159-242V ac, 47-63Hz @ 60°C All Channels ON
Nominal Input Voltage	240V ac
On-State Current	5mA @ 159V ac, 60Hz minimum 13mA @ 265V ac, 60Hz maximum
Maximum Off-State Voltage	40V ac
Maximum Off-State Current	2.5mA
Maximum Input Impedance @ 265V ac	20.38kΩ @ 60Hz
Input Delay Time Off to on Hardware delay On to off Hardware delay	Programmable filter: 1ms or 2ms 10ms maximum plus filter time Programmable filter: 9ms or 18ms 8ms maximum and filter time
Diagnostic Functions Change of state Time stamp of inputs	Software configurable +/- 200μs
Short/Inrush Current	250mA peak (decaying to <37% in 22ms, without activation)
Cyclic Update Time	User selectable (100μs minimum/750ms maximum)
Isolation Voltage Channel to channel User to system	100% tested at 2546V dc for 1s 100% tested at 2546V dc for 1s
RTB Screw Torque (Cage clamp)	4.4 inch-pounds (0.4Nm) maximum
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm	36 Position RTB (1756-TBCH or TBS6H) ¹
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing
Conductors Wire Size Category	22–14 gauge (2mm ²) stranded ¹ 3/64 inch (1.2mm) insulation maximum 1 ^{2,3}
Screwdriver Blade Width for RTB	1/8 inch (3.2mm) maximum
Agency Certification (when product or packaging is marked)	    Class I Div 2 Hazardous ⁴ Class I Div 2 Hazardous ⁴ marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-IN16

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

Feature	Default value	Page of description
Communications method	Standard input	
Nondiagnostic change of state	OFF-ON: Enabled ON-OFF: Enabled	
Input filter time	OFF-ON: 1ms ON-OFF: 1ms	

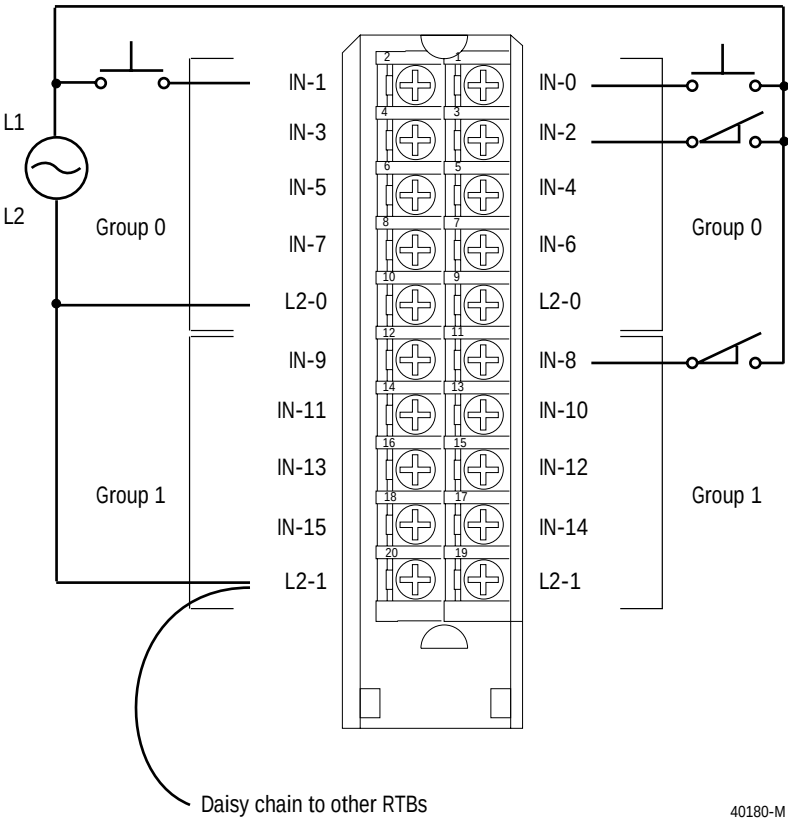
Wiring example

Use the following example to wire your module.

NOTES: All terminals with the same name are connected together on the module.
For example, L2 can be connected to any terminal marked L2-0.

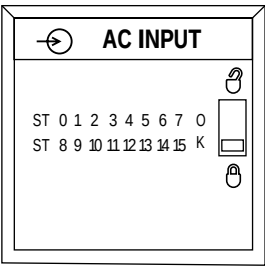
When you daisy chain from a group to another RTB, always connect the daisy chain to the terminal directly connected to the supply wire, as shown above.

This wiring example shows a single voltage source.



40180-M

LED indicator



20941-M

1756-IN16 Specifications

Number of Inputs	16 (8 points/common)
Module Location	1756 ControlLogix Chassis
Backplane Current	80mA @ 5.1V dc & 2mA @ 24V dc
Maximum Power Dissipation	5.1W @ 60°C
Thermal Dissipation	17.39 BTU/hr
On-State Voltage Range	10-30V ac, 47-63Hz
Nominal Input Voltage	24V ac
On-State Current	5mA @ 10V ac, 60Hz minimum 1.2mA @ 30V ac, 60Hz maximum
Maximum Off-State Voltage	5V
Maximum Off-State Current	2.75mA
Maximum Input Impedance @ 30V ac	2.5kΩ @ 60Hz
Input Delay Time	
Off to on	Programmable filter: 0ms, 1ms or 2ms
Hardware delay	10ms maximum plus filter time
On to off	Programmable filter: 9ms or 18ms
Hardware delay	10ms maximum plus filter time
Diagnostic Functions	
Change of state	Software configurable
Time stamp of inputs	+/- 200μs
Short/Inrush Current	250 mA peak (decaying to <37% in 22ms, without activation)
Cyclic Update Time	User Selectable (100μs minimum/750ms maximum)
Isolation Voltage	
Group to group	100% tested at 2546V dc for 1s
User to system	100% tested at 2546V dc for 1s
RTB Screw Torque (NEMA)	7–9 inch-pounds (0.8–1Nm)
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm	20 Position RTB (1756-TBNH or TBSH) ¹
Environmental Conditions	
Operating Temperature	0 to 60°C (32 to 140°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Relative Humidity	5 to 95% noncondensing
Conductors	
Wire Size	22–14 gauge (2mm ²) stranded ¹
Category	3/64 inch (1.2mm) insulation maximum 1 ^{2,3}
Screwdriver Blade Width for RTB	5/16 inch (8mm) maximum
Agency Certification (when product or packaging is marked)	    Class I Div 2 Hazardous ⁴ Class I Div 2 Hazardous ⁴ marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-0A16

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

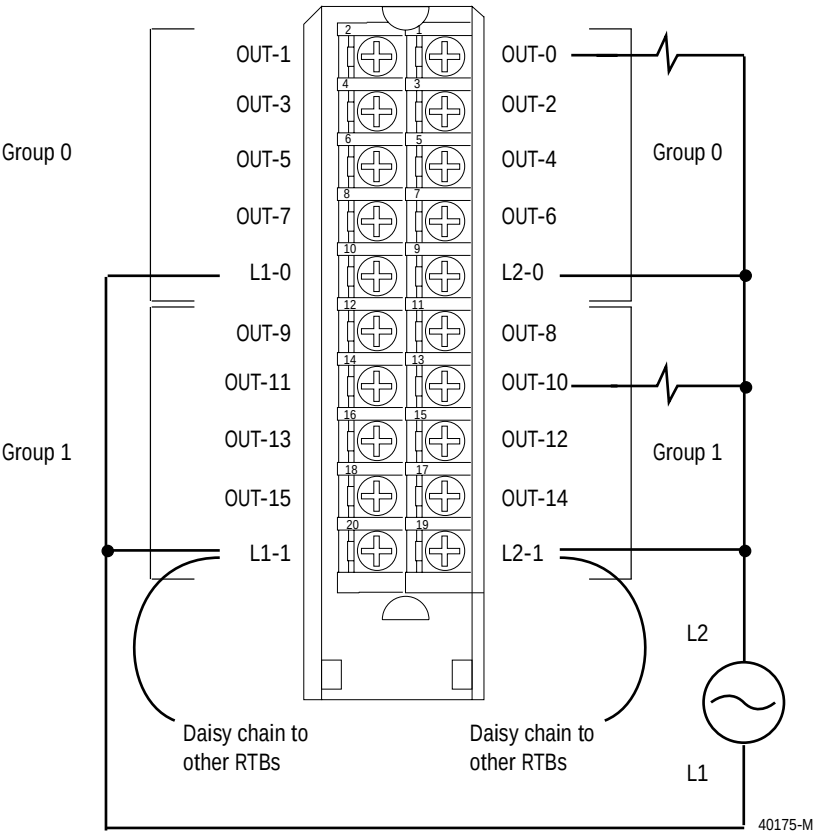
Feature	Default value	Page of description
Communications method	Standard output	
Mechanical fusing	Reset at user’s request	
Program mode	Off	
Fault mode	Off	
Idle to fault transition	Disabled	

Wiring example

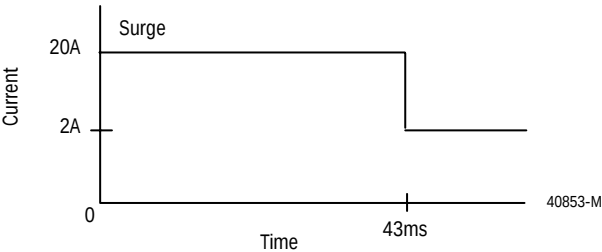
Use the following example to wire your module.

NOTES: When you daisy chain from a group to other RTBs, always connect the daisy chain to the terminal directly connected to the source wire, as shown above.

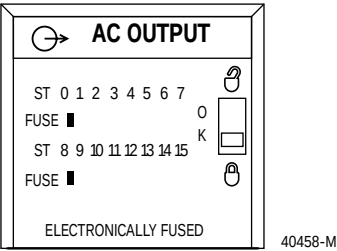
This wiring example shows a single voltage source.



Surge current chart



LED indicator



1756-OA16 Specifications

Number of Outputs	16 (8 points/common)
Module Location	1756 ControlLogix Chassis
Backplane Current	400mA @ 5.1V dc & 2mA @ 24V dc
Maximum Power Dissipation	6.5W @ 60°C
Thermal Dissipation	22.17 BTU/hr
Output Voltage Range	74-265V ac, 47-63Hz
Output Current Rating Per Point Per Group Per Module	0.5A maximum @ 60°C 2A maximum @ 60°C 4A maximum @ 60°C
Surge Current Per Point Per Group	5A for 43ms each, repeatable every 2s @ 60°C 15A for 43ms each, repeatable every 2s @ 60°C
Minimum Load Current	10mA per point
Maximum On-State Voltage Drop	1.5V @ 0.5A 5.7V @ load current < 50mA
Maximum Off-State Leakage Current	3mA per point
Commutating Voltage	4V/μs for loads>50mA 0.2V/μs for loads<50mA ¹
Output Delay Time Off to on On to off	9.3ms @ 60Hz; 11ms @ 50Hz 9.3ms @ 60Hz; 11ms @ 50Hz
Diagnostic Functions Fuse Blown Time stamp of diagnostics	1 Fuse and indicator/group +/- 1ms
Scheduled Outputs	Synchronization within 65ms maximum, reference to the Coordinated System Time
Configurable Fault States per Point	Hold Last State, ON or OFF (OFF is the default)
Configurable States in Program Mode per Point	Hold Last State, ON or OFF (OFF is the default)
Maximum Inhibit Voltage	Zero crossing 60V peak
Fusing	Mechanically fused/group 3.15A @ 250V ac slow blow 1500A interruption current Littelfuse p/n H2153.15 Schurter p/n 0001.2509
Isolation Voltage Group to group User to system	100% tested at 2546V dc for 1s 100% tested at 2546V dc for 1s
RTB Screw Torque (NEMA)	7-9 inch-pounds (0.8-1Nm)
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm and Housing	20 Position RTB (1756-TBNH or TBSH) ²
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing
Conductors Wire Size Category	22-14-gauge (2mm ²) stranded ² 3/64 inch (1.2mm) insulation maximum ^{1,3,4}
Screwdriver Blade Width for RTB	5/16 inch (8mm) maximum
Agency Certification (when product or packaging is marked)	   Class I Div 2 Hazardous ⁵ Class I Div 2 Hazardous ⁵ marked for all applicable directives

¹ The commutating dv/dt of the output voltage (OUTPUT to L2) should not exceed 0.2V/μs for loads under 50mA. The commutating dv/dt rating of the module for loads 50-500mA (OUTPUT TO L2) is 4V/μs maximum. If the commutating dv/dt rating of the TRIAC is exceeded, the TRIAC could latch on. If the commutating dv/dt rating is exceeded in the 10-50mA range, a resistor may be added across the output and L2. The purpose of this resistor is to increase the total output current to 50mA ($I=V/R$). At 50mA and above, the module has a higher commutating dv/dt rating. When adding a resistor for mthe output to L2, be sure it is rated for the power that it will dissipate ($P=(V^2)/R$). If the commutating dv/dt rating is exceeded in the 50-500mA range, the L1 AC waveform could be at fault. Be sure the waveform is a good sinusoid, void if any anomalies such as distorted or flattened sections.

² Maximum wire size will require extended housing - 1756-TBE.

³ Use this conductor category information for planning conductor routing as described in the system level installation manual.

⁴ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁵ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-OA16I

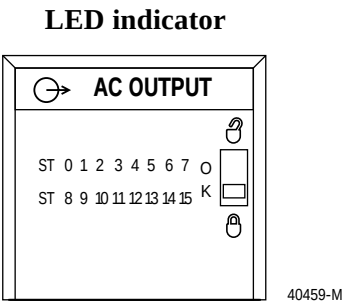
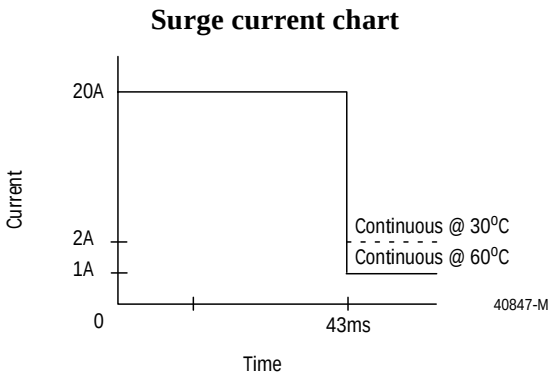
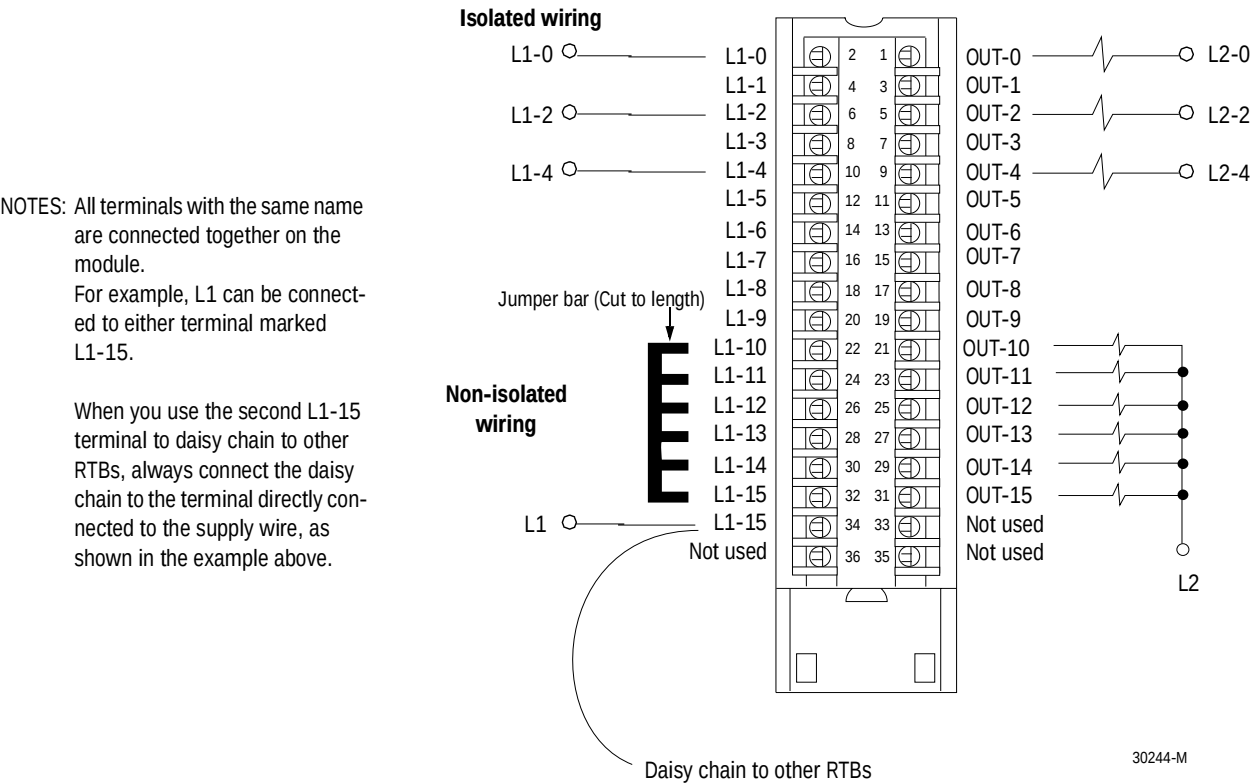
Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

Feature	Default value	Page of description
Communications method	Standard output	
Program mode	Off	
Fault mode	Off	
Idle to fault transition	Disabled	

Wiring example

Use the following example to wire your module.



1756-OA16I Specifications

Number of Outputs	16 (individually isolated)
Module Location	1756 ControlLogix Chassis
Backplane Current	300mA @ 5.1V dc & 2.5mA @ 24V dc
Maximum Power Dissipation	5.5W @ 60°C
Thermal Dissipation	18.76 BTU/hr
Output Voltage Range	74-265V ac, 47-63Hz
Output Current Rating Per Point Per Module	2A maximum @ 30°C & 1A maximum @ 60°C (Linear derating) 5A maximum @ 30°C & 4A maximum @ 60°C (Linear derating)
Surge Current per Point	20A for 43ms each, repeatable every 2s @ 60°C
Minimum Load Current	10mA per point
Maximum On-State Voltage Drop	1.5V peak @ 2A & 6V peak @ load current<50mA
Maximum Off-State Leakage Current	3mA per point
Commutating Voltage	4V/μs for loads>50mA 0.2V/μs for loads<50mA ¹
Output Delay Time Off to on On to off	9.3ms @ 60Hz; 11ms @ 50Hz 9.3ms @ 60Hz; 11ms @ 50Hz
Scheduled Outputs	Synchronization within 65ms maximum, reference to the Coordinated System Time
Configurable Fault States per Point	Hold Last State, ON or OFF (OFF is the default)
Configurable States in Program Mode per Point	Hold Last State, ON or OFF (OFF is the default)
Maximum Inhibit Voltage	Zero crossing 60V peak
Fusing	Not protected - Fused IFM is recommended to protect outputs (See publication 1492-2.12)
Isolation Voltage Channel to channel User to system	100% tested at 2546V dc for 1s 100% tested at 2546V dc for 1s
RTB Screw Torque (Cage clamp)	4.4 inch-pounds (0.4Nm) maximum
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm and Housing	36 Position RTB (1756-TBCH or TBS6H) ²
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing
Conductors Wire Size Category	22-14-gauge (2mm ²) stranded ² 3/64 inch (1.2mm) insulation maximum 1 ^{3,4}
Screwdriver Blade Width for RTB	1/8 inch (3.2mm) maximum
Agency Certification (when product or packaging is marked)	 Class I Div 2 Hazardous ⁵  Class I Div 2 Hazardous ⁵  marked for all applicable directives

¹ The commutating dv/dt of the output voltage (OUTPUT to L2) should not exceed 0.2V/μs for loads under 50mA. The commutating dv/dt rating of the module for loads 50-500mA (OUTPUT TO L2) is 4V/μs maximum. If the commutating dv/dt rating of the TRIAC is exceeded, the TRIAC could latch on. If the commutating dv/dt rating is exceeded in the 10-50mA range, a resistor may be added across the output and L2. The purpose of this resistor is to increase the total output current to 50mA ($I=V/R$). At 50mA and above, the module has a higher commutating dv/dt rating. When adding a resistor for mthe output to L2, be sure it is rated for the power that it will dissipate ($P=(V^2)/R$). If the commutating dv/dt rating is exceeded in the 50-500mA range, the L1 AC waveform could be at fault. Be sure the waveform is a good sinusoid, void if any anomalies such as distorted or flattened sections.

² Maximum wire size will require extended housing - 1756-TBE.

³ Use this conductor category information for planning conductor routing as described in the system level installation manual.

⁴ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁵ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-OA8

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

Feature	Default value	Page of description
Communications method	Standard output	
Program mode	Off	
Fault mode	Off	
Idle to fault transition	Disabled	

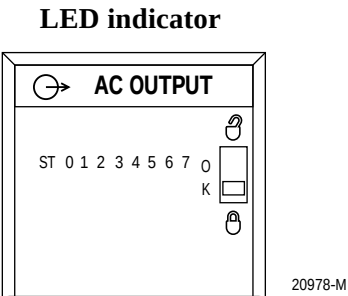
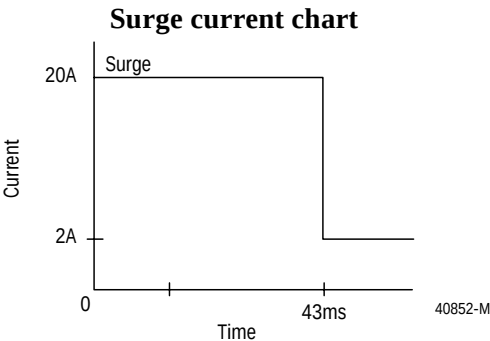
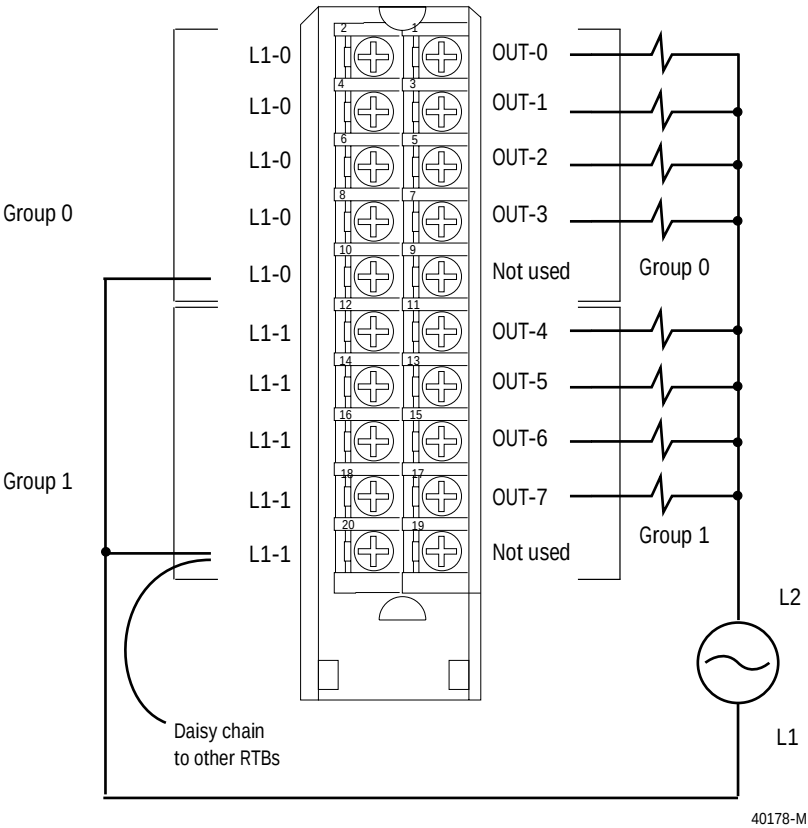
Wiring example

Use the following example to wire your module.

NOTES: All terminals with the same name are connected together on the module.
For example, L1 can be connected to any terminal marked L1-0.

When you daisy chain from a group to another RTB, always connect the daisy chain to the terminal directly connected to the supply wire, as shown above.

This wiring example shows a single voltage source.



1756-OA8 Specifications

Number of Outputs	8 (4 points/common)
Module Location	1756 ControlLogix Chassis
Backplane Current	200mA @ 5.1V dc & 2mA @ 24V dc
Maximum Power Dissipation	5.1W @ 60°C
Thermal Dissipation	17.39 BTU/hr
Output Voltage Range	74-265V ac, 47-63Hz
Output Current Rating Per Point Per Module	2A maximum @ 60°C (Linear derating) 5A maximum @ 30°C & 4A maximum @ 60°C (Linear derating)
Surge Current per Point	20A for 43ms each, repeatable every 2s @ 60°C
Minimum Load Current	10mA per point
Maximum On-State Voltage Drop	1.5V peak @ 2A & 6V peak @ current<50mA
Maximum Off-State Leakage Current	3mA per point
Commutating Voltage	4V/μs for loads>50mA 0.2V/μs for loads<50mA ¹
Output Delay Time Off to on On to off	9.3ms @ 60Hz; 11ms @ 50Hz 9.3ms @ 60Hz; 11ms @ 50Hz
Scheduled Outputs	Synchronization within 65ms maximum, reference to the Coordinated System Time
Configurable Fault States per Point	Hold Last State, ON or OFF (OFF is the default)
Configurable States in Program Mode per Point	Hold Last State, ON or OFF (OFF is the default)
Maximum Inhibit Voltage	Zero crossing 60V peak
Fusing	Not protected - Fused IFM is recommended to protect outputs (See publication 1492-2.12)
Isolation Voltage Group to group User to system	100% tested at 2546V dc for 1s 100% tested at 2546V dc for 1s
RTB Screw Torque (NEMA)	7-9 inch-pounds (0.8–1Nm)
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm and Housing	20 Position RTB (1756-TBNH or TBSH) ²
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing
Conductors Wire Size Category	22-14-gauge (2mm ²) stranded ² 3/64 inch (1.2mm) insulation maximum ^{1,3,4}
Screwdriver Blade Width for RTB	5/16 inch (8mm) maximum
Agency Certification (when product or packaging is marked)	 Class I Div 2 Hazardous ⁵  Class I Div 2 Hazardous ⁵  marked for all applicable directives

¹ The commutating dv/dt of the output voltage (OUTPUT to L2) should not exceed 0.2V/μs for loads under 50mA. The commutating dv/dt rating of the module for loads 50-500mA (OUTPUT TO L2) is 4V/μs maximum. If the commutating dv/dt rating of the TRIAC is exceeded, the TRIAC could latch on. If the commutating dv/dt rating is exceeded in the 10-50mA range, a resistor may be added across the output and L2. The purpose of this resistor is to increase the total output current to 50mA ($I=V/R$). At 50mA and above, the module has a higher commutating dv/dt rating. When adding a resistor for the output to L2, be sure it is rated for the power that it will dissipate ($P=(V^2)/R$). If the commutating dv/dt rating is exceeded in the 50-500mA range, the L1 AC waveform could be at fault. Be sure the waveform is a good sinusoid, void if any anomalies such as distorted or flattened sections.

² Maximum wire size will require extended housing - 1756-TBE.

³ Use this conductor category information for planning conductor routing as described in the system level installation manual.

⁴ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁵ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-OA8D Specifications

Number of Outputs	8 (4 points/common)
Module Location	1756 ControlLogix Chassis
Backplane Current	110mA @ 5.1V dc & 100mA @ 24V dc
Maximum Power Dissipation	5.3W @ 60°C
Thermal Dissipation	18 BTU/hr
Output Voltage Range	74-132V ac, 47-63Hz
Output Current Rating Per Point Per Module	1A maximum @ 30°C & 0.5A maximum @ 60°C (Linear derating) 8A maximum @ 30°C & 4A maximum @ 60°C (Linear derating)
Surge Current per Point	8A for 43ms each, repeatable every 2s @ 30°C 5A for 43ms each, repeatable every 1s @ 60°C
Minimum Load Current	10mA per point
Maximum On-State Voltage Drop	2.5V peak @ 0.5A & 3V peak @ 1A
Maximum Off-State Leakage Current	3mA per point
Output Delay Time Off to on On to off	9.3ms @ 60Hz; 11ms @ 50Hz 9.3ms @ 60Hz; 11ms @ 50Hz
Diagnostic Functions Short Trip NoLoad Output Verification Pulse Test Field Power Loss (Zero Cross) Time stamp of diagnostics	12A for 500µs minimum Off state detection only On state detection only User selectable maximum width & user selectable maximum time delay from zero cross Detects at 25V peak minimum (Firmware phase locked loop) +/- 1ms
Scheduled Outputs	Synchronization within 65ms maximum, reference to the Coordinated System Time
Configurable Fault States per Point	Hold Last State, ON or OFF (OFF is the default)
Configurable States in Program Mode per Point	Hold Last State, ON or OFF (OFF is the default)
Maximum Inhibit Voltage	Zero crossing 25V peak
Fusing	Electronically fused per point
Isolation Voltage Group to group User to system	100% tested at 2546V dc for 1s 100% tested at 2546V dc for 1s
RTB Screw Torque (NEMA)	7-9 inch-pounds (0.8-1Nm)
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm and Housing	20 Position RTB (1756-TBNH or TBSH)
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing
Conductors Wire Size Category	22-14-gauge (2mm ²) stranded ¹ 3/64 inch (1.2mm) insulation maximum 1 ^{2,3}
Screwdriver Width for RTB	5/16 inch (8mm) maximum
Agency Certification (when product or packaging is marked)	    Class I Div 2 Hazardous ⁴ Class I Div 2 Hazardous ⁴ marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-OA8E

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

Feature	Default value	Page of description
Communications method	Standard output	
Field power loss	Enabled	
Diagnostic latch	Enalbed	
Electronic fusing	Reset at user's request	
Program mode	Off	
Fault mode	Off	
Idle to fault transition	Disabled	

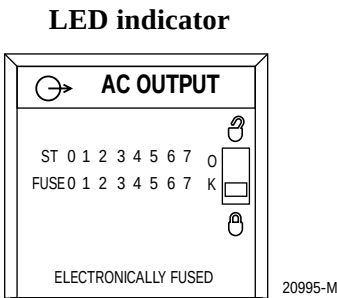
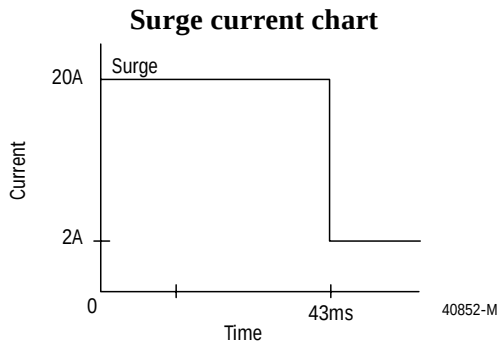
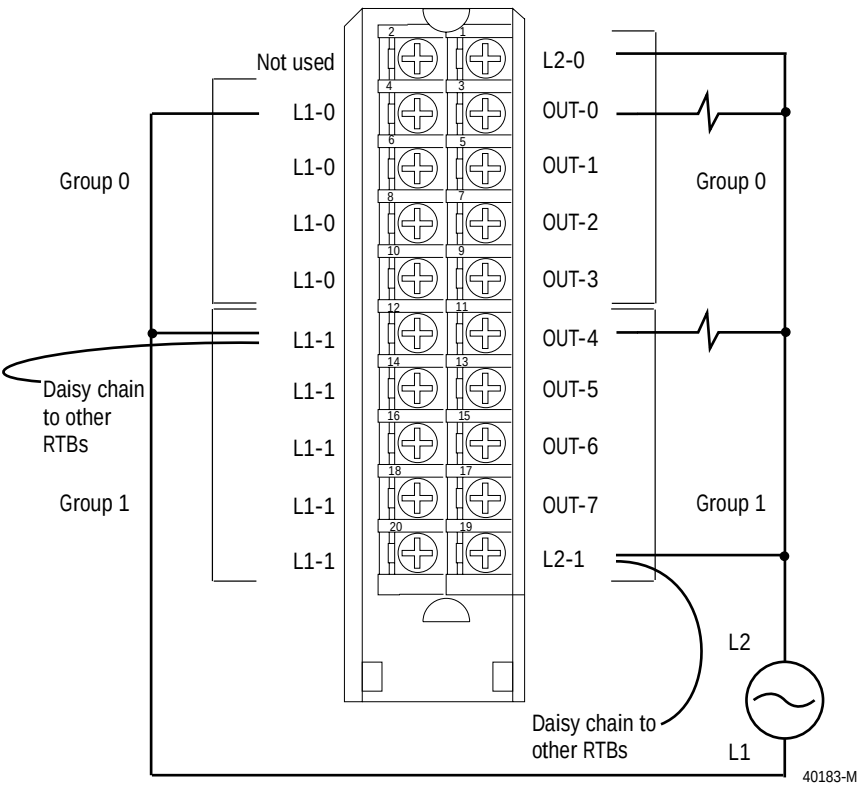
Wiring example

Use the following example to wire your module.

NOTES: All terminals with the same name are connected together on the module.
For example, L1 can be connected to any terminal marked L1-0.

When you daisy chain from a group to another RTB, always connect the daisy chain to the terminal directly connected to the supply wire, as shown above.

This wiring example shows a single voltage source.



1756-OA8E Specifications

Number of Outputs	8 (4 points/common)
Module Location	1756 ControlLogix Chassis
Backplane Current	110mA @ 5.1V dc & 100mA @ 24V dc
Maximum Power Dissipation	5.5W @ 60°C
Thermal Dissipation	18.76 BTU/hr
Output Voltage Range	74-132V ac, 47-63Hz
Output Current Rating Per Point Per Group Per Module	2A maximum @ 60°C 4A maximum @ 30°C & 2A max @ 60°C (Linear derating) 8A maximum @ 30°C & 4A max @ 60°C (Linear derating)
Surge Current per Point	20A for 43ms each, repeatable every 2s @ 60°C
Minimum Load Current	10mA per point
Maximum On-State Voltage Drop	4V peak @ 2A
Maximum Off-State Leakage Current	3mA per point
Output Delay Time Off to on On to off	9.3ms @ 60Hz; 11ms @ 50Hz 9.3ms @ 60Hz; 11ms @ 50Hz
Diagnostic Functions Short Trip Field Power Loss (Zero Cross) Time stamp of Diagnostics	>20A for 100ms minimum Detects at 25V peak minimum (Firmware phase locked loop) +/- 1ms
Scheduled Outputs	Synchronization within 65ms maximum, reference to Coordinated System Time
Configurable Fault States per Point	Hold Last State, ON or OFF (OFF is the default)
Configurable States in Program Mode per Point	Hold Last State, ON or OFF (OFF is the default)
Maximum Inhibit Voltage	Zero crossing 25V peak
Fusing	Electronically fused per point
Isolation Voltage Group to group User to system	100% tested at 2546V dc for 1s 100% tested at 2546V dc for 1s
RTB Screw Torque (NEMA)	7-9 inch-pounds (0.8-1Nm)
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm and Housing	20 Position RTB (1756-TBNH or TBSH) ¹
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing
Conductors Wire Size Category	22-14-gauge (2mm ²) stranded ¹ 3/64 inch (1.2mm) insulation maximum ^{1,2,3}
Screwdriver Blade Width for RTB	5/16 inch (8mm) maximum
Agency Certification (when product or packaging is marked)	 Class I Div 2 Hazardous ⁴  Class I Div 2 Hazardous ⁴  marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-OB16D

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

Feature	Default value	Page of description
Communications method	Standard output	
Output verify	Enabled	
No load	Enabled	
Diagnostic latch	Enalbed	
Pulse test	Performed at user’s request	
Electronic fusing	Reset at user’s request	
Program mode	Off	
Fault mode	Off	
Idle to fault transition	Disabled	

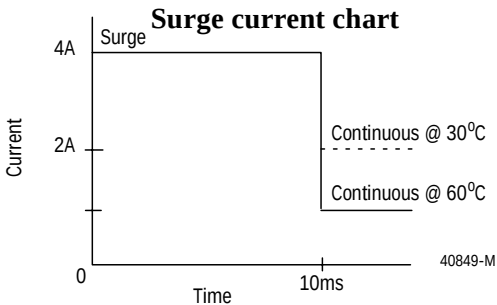
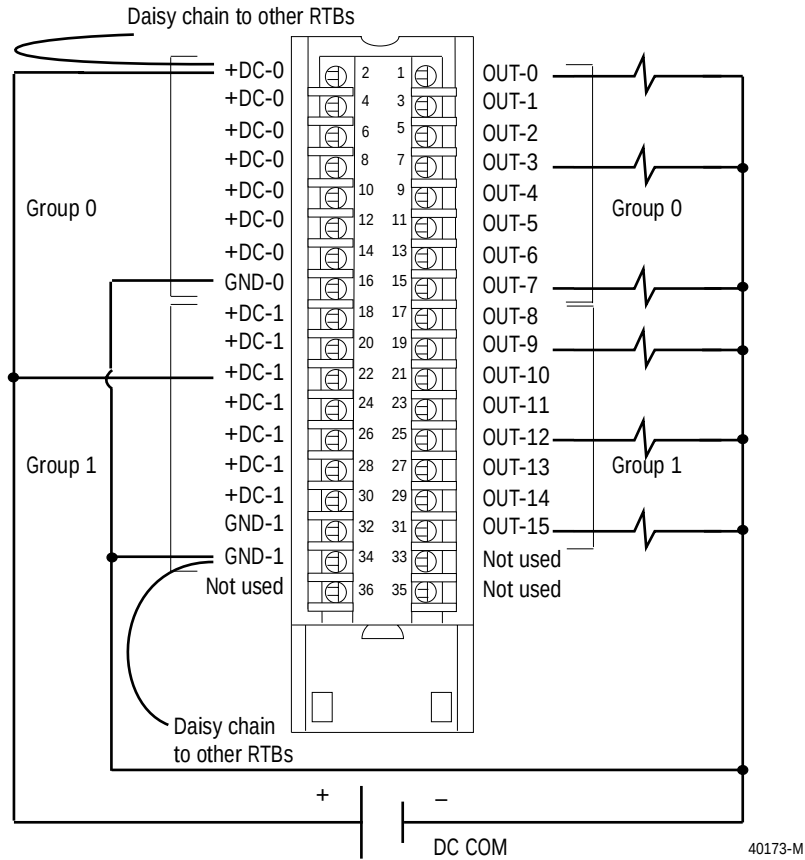
Wiring example

Use the following example to wire your module.

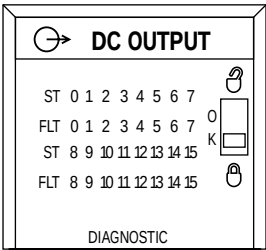
NOTES: All terminals with the same name are connected together on the module.
For example, DC COM can be connect-
ed to either terminal marked GND-1.

When you daisy chain from a group to
another RTB, always connect the daisy
chain to the terminal directly connect-
ed to the supply wire, as shown in the
example above.

This wiring example shows a single
voltage source.



LED indicator



1756-OB16D Specifications

Number of Outputs	16 (8 points/common)
Module Location	1756 ControlLogix Chassis
Backplane Current	220mA @ 5.1V dc & 40mA @ 24V dc
Maximum Power Dissipation	3.3W @ 60°C
Thermal Dissipation	11.25 BTU/hr
Output Voltage Range	19.2-30V dc
Output Current Rating Per Point Per Module	2A maximum @ 30°C & 1A maximum @ 60°C (Linear derating) 8A maximum @ 30°C & 4A maximum @ 60°C (Linear derating)
Surge Current per Point	4A for 10ms each, repeatable every 1s
Minimum Load Current	3mA per point
Maximum On-State Voltage Drop	1.2V dc @ 2A
Maximum Off-State Leakage Current	1mA per point
Output Delay Time OFF to ON ON to OFF	1ms maximum 5ms maximum
Diagnostic Functions: Short trip No load Output verification Pulse test Time stamp of diagnostics	8A 180ms minimum 10A 120ms minimum OFF STATE detection only ON STATE detection only User selectable maximum pulse width +/- 1ms
Scheduled Outputs	Synchronization within 65ms maximum, reference to the Coordinated System Time
Configurable Fault States per Point	Hold Last State, ON or OFF (OFF is the default)
Configurable States in Program Mode per Point	Hold Last State, ON or OFF (OFF is the default)
Fusing	Electronically fused per point
Reverse Polarity Protection	None - If module is wired incorrectly, outputs may be damaged.
Isolation Voltage Group to group User to system	100% tested at 2546V dc for 1s 100% tested at 2546V dc for 1s
RTB Screw Torque (Cage clamp)	4.4 inch-pounds (0.4Nm) maximum
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm and Housing	36 Position RTB (1756-TBCH or TBS6H) ¹
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing
Conductors Wire Size Category	22-14-gauge (2mm ²) stranded ¹ 3/64 inch (1.2mm) insulation maximum ^{1,2,3}
Screwdriver Blade Width for RTB	1/8 inch (3.2mm) maximum
Agency Certification (when product or packaging is marked)	    Class I Div 2 Hazardous ⁴ Class I Div 2 Hazardous ⁴ marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-OB16E

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

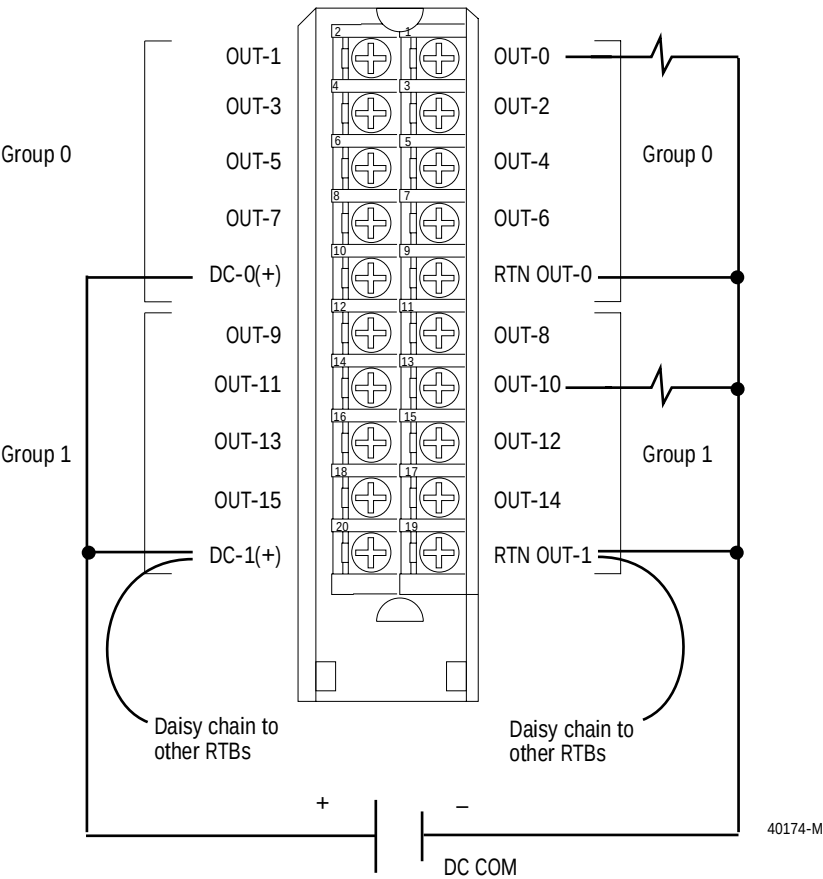
Feature	Default value	Page of description
Communications method	Standard output	
Electronic fusing	Reset at user’s request	
Program mode	Off	
Fault mode	Off	
Idle to fault transition	Disabled	

Wiring example

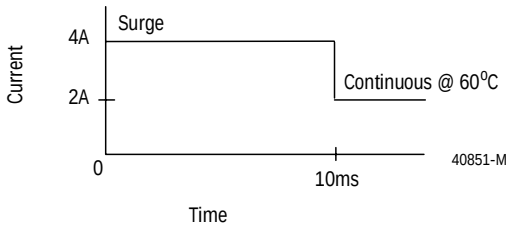
Use the following example to wire your module.

NOTES: When you daisy chain from a group to another RTB, always connect the daisy chain to the terminal directly connected to the supply wire, as shown in the example.

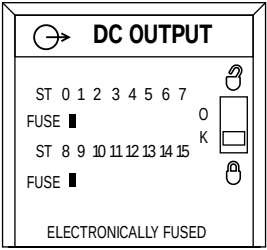
This wiring example shows a single voltage source.



Surge current chart



LED indicator



1756-OB16E Specifications

Number of Outputs	16 (8 points/common)
Module Location	1756 ControlLogix Chassis
Backplane Current	250mA @ 5.1V dc & 2mA @ 24V dc
Maximum Power Dissipation	4.1W @ 60°C
Thermal Dissipation	13.98 BTU/hr
Output Voltage Range	10-31.2V dc
Output Current Rating Per Point Per Module	1A maximum @ 60°C 8A maximum @ 60°C
Surge Current per Point	2A for 10ms each, repeatable every 2s @ 60°C
Minimum Load Current	3mA per output
Maximum On-State Voltage Drop	400mV dc @ 1A
Maximum Off-State Leakage Current	1mA per point
Output Delay Time Off to On On to Off	1ms maximum 1ms maximum
Diagnostic Functions: Short Trip Time stamp of diagnostics	1.8A @ 24V dc (Output ON, then short) 4.1A @ 24V dc for 18ms (Output ON into short) +/- 1ms
Scheduled Outputs	Synchronization within 65ms maximum, reference to the Coordinated System Time
Configurable Fault States per Point	Hold Last State, ON or OFF (OFF is the default)
Configurable States in Program Mode per Point	Hold Last State, ON or OFF (OFF is the default)
Fusing	Electronically fused per group
Reverse Polarity Protection	None - If module is wired incorrectly, outputs may be damaged.
Isolation Voltage Group to group User to system	100% tested at 2546V dc for 1s 100% tested at 2546V dc for 1s
RTB Screw Torque (NEMA)	7-9 inch-pounds (0.8-1Nm)
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm and Housing	20 Position RTB (1756-TBNH or TBSH) ¹
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing
Conductors Wire Size Category	22-14-gauge (2mm ²) stranded ¹ 3/64 inch (1.2mm) insulation maximum 1 ^{2,3}
Screwdriver Blade Width for RTB	5/16 inch (8mm) maximum
Agency Certification (when product or packaging is marked)	 Class I Div 2 Hazardous ⁴  Class I Div 2 Hazardous ⁴  marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-OB16I

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

Feature	Default value	Page of description
Communications method	Standard output	
Program mode	Off	
Fault mode	Off	
Idle to fault transition	Disabled	

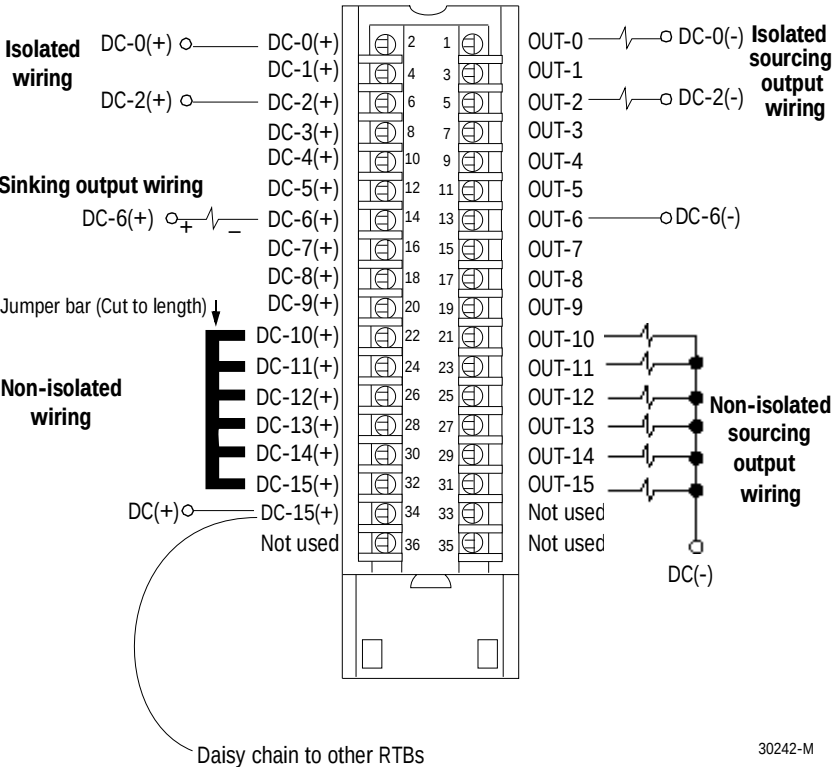
Wiring example

Use the following example to wire your module.

NOTES: All terminals with the same name are connected together on the module.
For example, DC(+) can be connected to either terminal marked DC-15.

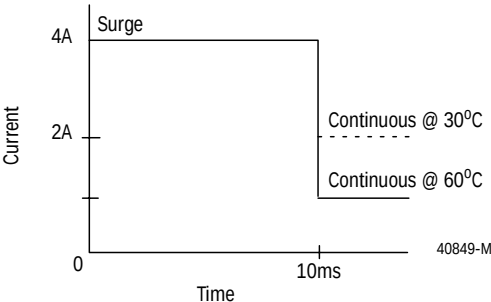
When you use the second DC-15(+) terminal to daisy chain to other RTBs, always connect the daisy chain to the terminal directly connected to the supply wire, as shown in the example above.

Outputs can be wired in a sink or source configuration as shown above.



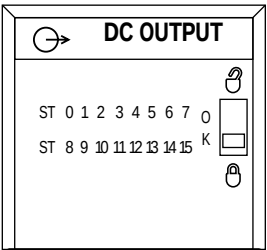
30242-M

Surge current chart



40849-M

LED indicator



40457-M

1756-OB16I Specifications

Number of Outputs	16 (individually isolated)
Module Location	1756 ControlLogix Chassis
Backplane Current	350mA @ 5.1V dc & 2.5mA @ 24V dc
Maximum Power Dissipation	3.6W @ 60°C
Thermal Dissipation	12.28 BTU/hr
Output Voltage Range	10-30V dc
Output Current Rating Resistive: Per Point Per Module Inductive: Per Point Per Module	2A maximum @ 30°C & 1A maximum @ 60°C (Linear derating) 8A maximum @ 30°C & 4A maximum @ 60°C (Linear derating) 1A maximum @ 60°C 8A maximum @ 30°C & 4A maximum @ 60°C (Linear derating)
Surge Current per Point	4A for 10ms each, repeatable every 2s
Minimum Load Current	1mA per point
Maximum On-State Voltage Drop	1.2V dc @ 2A
Maximum Off-State Leakage Current	0.5mA per point
Output Delay Time Off to on On to off	1ms maximum 2ms maximum
Scheduled Outputs	Synchronization within 65ms maximum, reference to the Coordinated System Time
Configurable Fault States per Point	Hold Last State, ON or OFF (OFF is the default)
Configurable States in Program Mode per Point	Hold Last State, ON or OFF (OFF is the default)
Fusing	Not protected - Fused IFM is recommended to protect outputs (See publication 1492-2.12)
Reverse Polarity Protection	None (If module is wired incorrectly, outputs may be damaged.)
Isolation Voltage Channel to channel User to system	100% tested at 2546V dc for 1s 100% tested at 2546V dc for 1s
RTB Screw Torque (Cage clamp)	4.4 inch-pounds (0.4Nm) maximum
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm and Housing	36 Position RTB (1756-TBCH or TBS6H) ¹
Screwdriver Blade Width for RTB	1/8 inch (3.2mm) maximum
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing
Conductors Wire Size Category	22-14-gauge (2mm ²) stranded ¹ 3/64 inch (1.2mm) insulation maximum 1 ^{2,3}
Agency Certification (when product or packaging is marked)	    Class I Div 2 Hazardous ⁴ Class I Div 2 Hazardous ⁴ marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-OB32

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

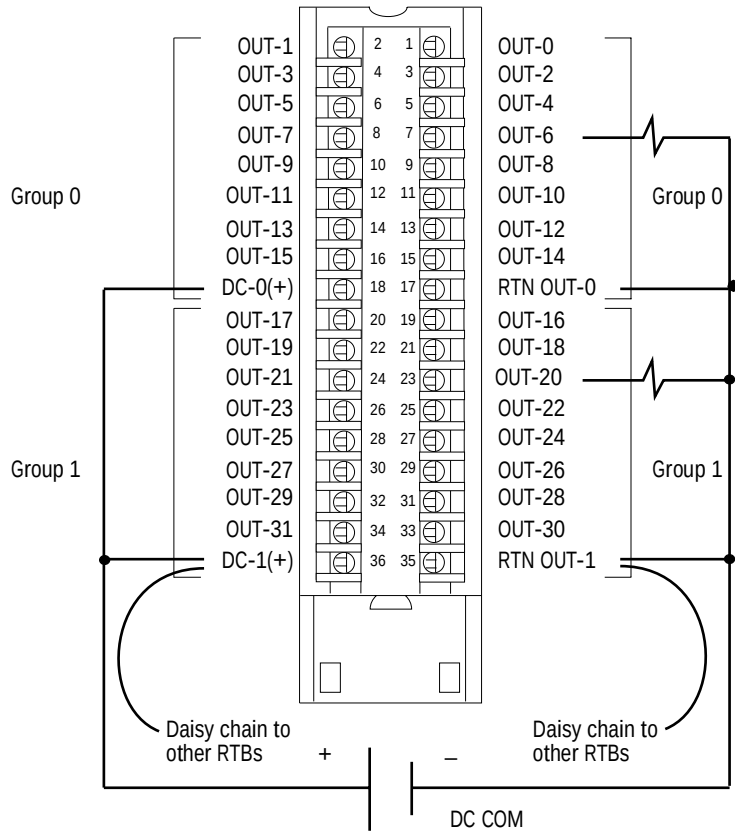
Feature	Default value	Page of description
Communications method	Standard output	
Program mode	Off	
Fault mode	Off	
Idle to fault transition	Disabled	

Wiring example

Use the following example to wire your module.

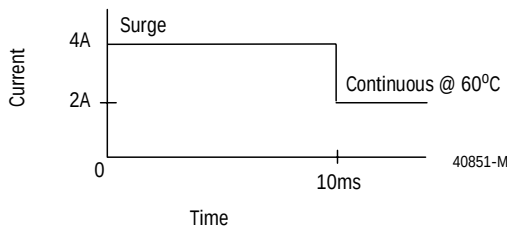
NOTES: When you daisy chain from a group to another RTB, always connect the daisy chain to the terminal directly connected to the supply wire, as shown above.

This wiring example uses a single voltage source.



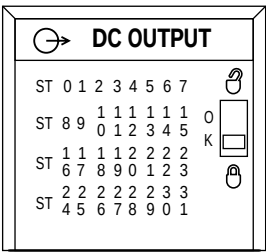
40171-M

Surge current chart



40851-M

LED indicator



40465-M

1756-OB32 Specifications

Number of Outputs	32 (16 points/common)
Module Location	1756 ControlLogix Chassis
Backplane Current	300mA @ 5.1V dc & 2mA @ 24V dc
Maximum Power Dissipation	4.8W @ 60°C
Thermal Dissipation	16.37 BTU/hr
Output Voltage Range	10-31.2V dc @ 50°C (Linear derating) 10-28V dc @ 60°C
Output Current Rating Per Point Per Module	0.5A maximum @ 50°C (Linear derating) 0.35A maximum @ 60°C 16A maximum @ 50°C (Linear derating) 10A maximum @ 60°C
Surge Current per Point	1A for 10ms each, repeatable every 2s @ 60°C
Minimum Load Current	3mA per point
Maximum On-State Voltage Drop	200mV dc @ 0.5A
Maximum Off-State Leakage Current	0.5mA per point
Output Delay Time Off to on On to off	1ms maximum 1ms maximum
Scheduled Outputs	Synchronization within 65ms maximum, reference to the Coordinated System Time
Configurable Fault States per Point	Hold Last State, ON or OFF (OFF is the default)
Configurable States in Program Mode per Point	Hold Last State, ON or OFF (OFF is the default)
Fusing	Not protected - Fused IFM is recommended to protect outputs (See publication 1492-2.12)
Reverse Polarity Protection	None - If module is wired incorrectly, outputs may be damaged.
Isolation Voltage Group to group User to system	100% tested at 2546V dc for 1s 100% tested at 2546V dc for 1s
RTB Screw Torque (Cage clamp)	4.4 inch-pounds (0.4Nm) maximum
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm and Housing	36 Position RTB (1756-TBNH or TBSH) ¹
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing
Conductors Wire Size Category	22-14 gauge (2mm ²) stranded ¹ 3/64 inch (1.2mm) insulation maximum 1 ^{2,3}
Screwdriver Blade Width for RTB	1/8 inch (3.2mm) maximum
Agency Certification (when product or packaging is marked)	    Class I Div 2 Hazardous ⁴ Class I Div 2 Hazardous ⁴ marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-OB8

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

Feature	Default value	Page of description
Communications method	Standard output	
Program mode	Off	
Fault mode	Off	
Idle to fault transition	Disabled	

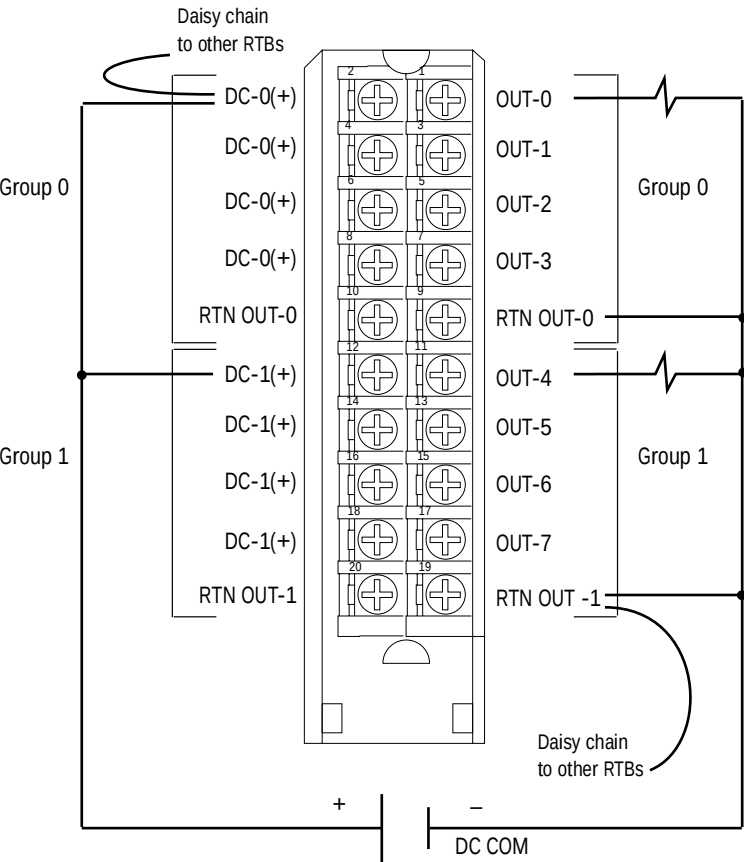
Wiring example

Use the following example to wire your module.

NOTES: All terminals with the same name are connected on the module. For example, DC COM can be connected to either terminal marked RTN OUT-1.

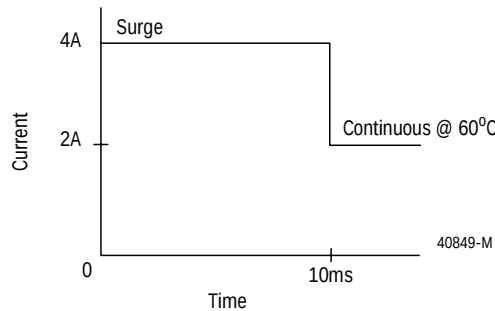
When you daisy chain from a group to another RTB, always connect the daisy chain to the terminal directly connected to the supply wire, as shown above.

This wiring example shows a single voltage source.



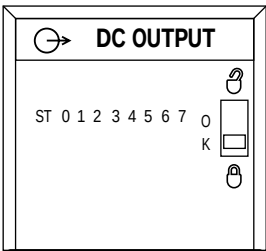
40181-M

Surge current chart



40849-M

LED indicator



40466-M

1756-OB8 Specifications

Number of Outputs	8 (4 points/common)
Module Location	1756 ControlLogix Chassis
Backplane Current	70mA @ 5.1V dc & 2mA @ 24V dc
Maximum Power Dissipation	2.5W @ 60°C
Thermal Dissipation	8.53 BTU/hr
Output Voltage Range	10-30V dc
Output Current Rating Per Point Per Module	2A maximum @ 60°C 8A maximum @ 60°C
Surge Current per Point	4A for 10ms each, repeatable every 1s @ 60°C
Minimum Load Current	2mA per point
Maximum On-State Voltage Drop	2V dc @ 2A
Maximum Off-State Leakage Current	1mA per point
Output Delay Time Off to on On to off	1ms maximum 2ms maximum
Scheduled Outputs	Synchronization within 65ms maximum, reference to the Coordinated System Time
Configurable Fault States per Point	Hold Last State, ON or OFF (OFF is the default)
Configurable States in Program Mode per Point	Hold Last State, ON or OFF (OFF is the default)
Fusing	Not protected - Fused IFM is recommended to protect outputs (See publication 1492-2.12)
Reverse Polarity Protection	None - If module is wired incorrectly, outputs may be damaged.
Isolation Voltage Group to group User to system	100% tested at 2546V dc for 1s 100% tested at 2546V dc for 1s
RTB Screw Torque (NEMA)	7-9 inch-pounds (0.8-1Nm)
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm and Housing	20 Position RTB (1756-TBNH or TBSH) ¹
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing
Conductors Wire Size Category	22-14-gauge (2mm ²) stranded ¹ 3/64 inch (1.2mm) insulation maximum 1 ^{2,3}
Screwdriver Blade Width for RTB	5/16 inch (8mm) maximum
Agency Certification (when product or packaging is marked)	   Class I Div 2 Hazardous ⁴ Class I Div 2 Hazardous ⁴ marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-OB8EI

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

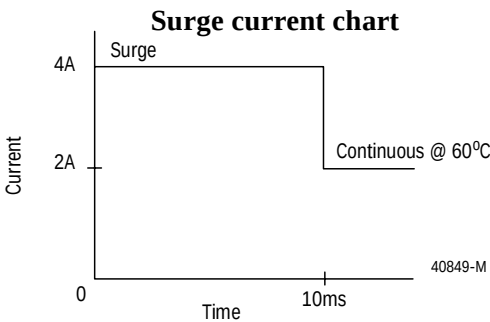
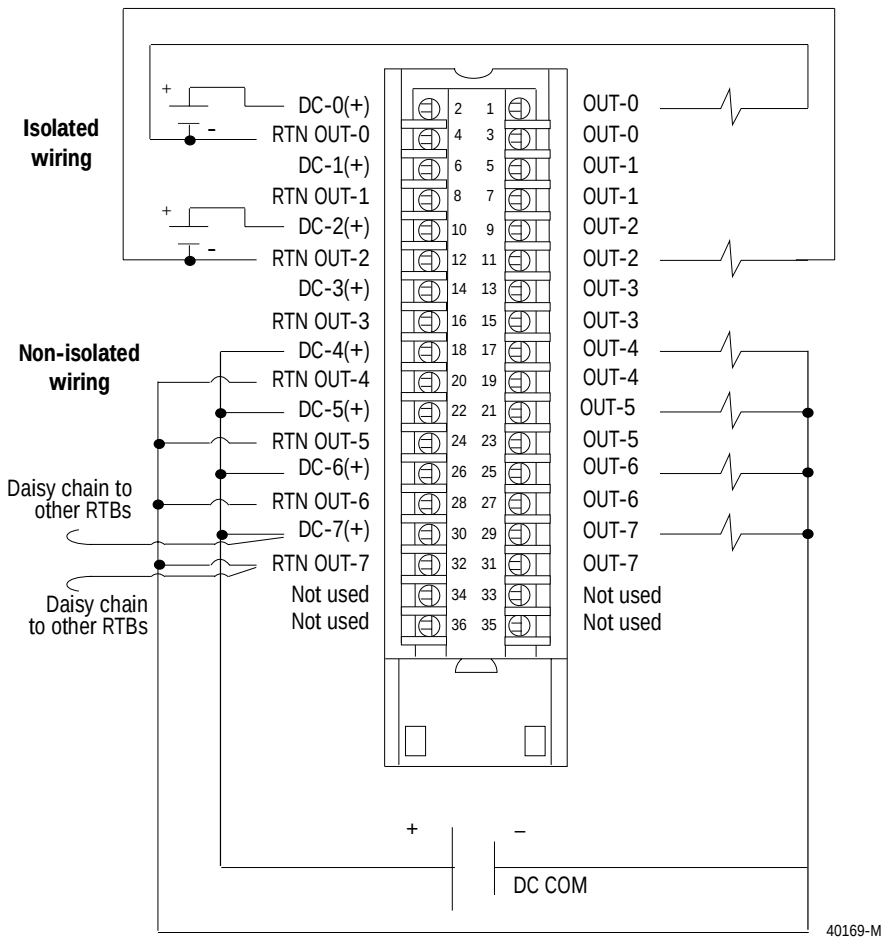
Feature	Default value	Page of description
Communications method	Standard output	
Electronic fusing	Reset at user’s request	
Program mode	Off	
Fault mode	Off	
Idle to fault transition	Disabled	

Wiring example

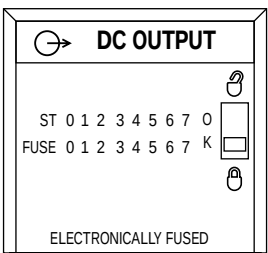
Use the following example to wire your module.

NOTES: All terminals with the same name are connected together on the module.
For example, the load can be connected to either terminal marked OUT-0.

When you daisy chain to other RTBs, always connect the daisy chain to the terminal directly connected to the supply wire, as shown above.



LED indicator



1756-OB8EI Specifications

Number of Outputs	8 (individually isolated)
Module Location	1756 ControlLogix Chassis
Backplane Current	250mA @ 5.1V dc & 2mA @ 24V dc
Maximum Power Dissipation	4.7W @ 60°C
Thermal Dissipation	16.03 BTU/hr
Output Voltage Range	10-30V dc
Output Current Rating Per Point Per Module	2A maximum @ 60°C 8A maximum @ 60°C
Surge Current per Point	4A for 10ms each, repeatable every 2s
Minimum Load Current	3mA per point
Maximum On-State Voltage Drop	1.2V dc @ 2A
Maximum Off-State Leakage Current	1mA per point
Output Delay Time Off to on On to off	1ms maximum 5ms maximum
Diagnostic Functions: Short trip Time stamp of diagnostics	>4.5A for 500µs maximum (Output ON, then short) >4.5A for 1.5ms maximum (Output ON into short) +/- 1ms
Scheduled Outputs	Synchronization within 65ms maximum, reference to the Coordinated System Time
Configurable Fault States per Point	Hold Last State, ON or OFF (OFF is the default)
Configurable States in Program Mode per Point	Hold Last State, ON or OFF (OFF is the default)
Fusing	Electronically fused per point
Reverse Polarity Protection	None - If module is wired incorrectly, outputs may be damaged.
Isolation Voltage Channel to channel User to system	100% tested at 2546V dc for 1s 100% tested at 2546V dc for 1s
RTB Screw Torque (Cage clamp)	4.4 inch-pounds (0.4Nm) maximum
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm and Housing	36 Position RTB (1756-TBCH or TBS6H) ¹
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing
Conductors Wire Size Category	22-14-gauge (2mm ²) stranded ¹ 3/64 inch (1.2mm) insulation maximum 1 ^{2,3}
Screwdriver Blade Width for RTB	1/8 inch (3.2mm) maximum
Agency Certification (when product or packaging is marked)	 Class I Div 2 Hazardous ⁴  Class I Div 2 Hazardous ⁴  marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-OC8

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

Feature	Default value	Page of description
Communications method	Standard output	
Program mode	Off	
Fault mode	Off	
Idle to fault transition	Disabled	

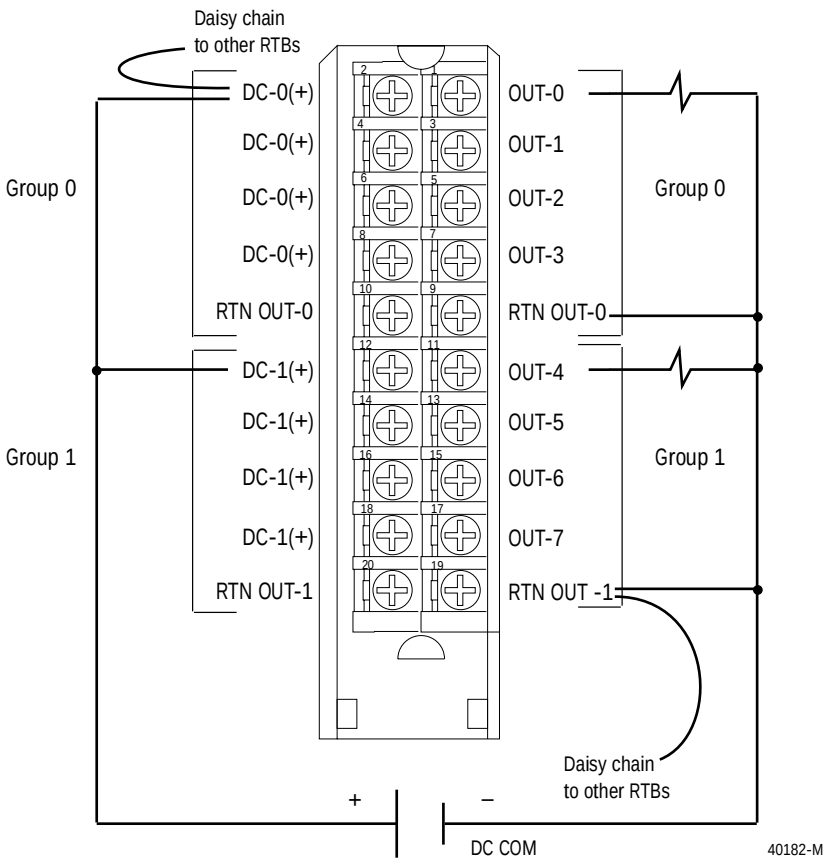
Wiring example

Use the following example to wire your module.

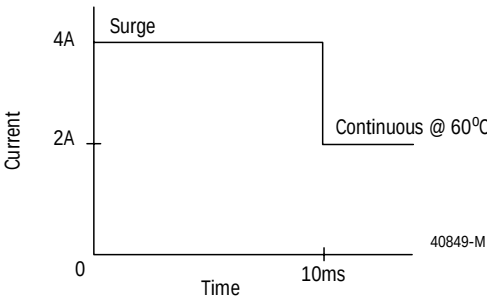
NOTES: All terminals with the same name are connected together on the module.
For example, DC COM can be connected to either terminal marked RTN OUT-1.

When you daisy chain from a group to another RTB, always connect the daisy chain to the terminal directly connected to the supply wire, as shown above.

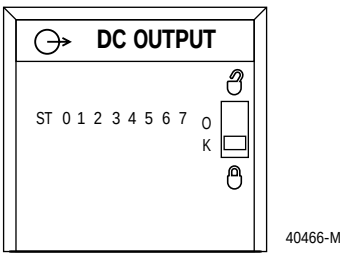
This wiring example shows a single voltage source.



Surge current chart



LED indicator



1756-OC8 Specifications

Number of Outputs	8 (4 points/common)
Module Location	1756 ControlLogix Chassis
Backplane Current	70mA @ 5.1V dc & 2mA @ 24V dc
Maximum Power Dissipation	4.9W @ 60°C
Thermal Dissipation	16.71 BTU/hr
On State Voltage Range	30-60V dc
Output Current Rating Per Point Per Module	2A maximum @ 60°C 8A maximum @ 60°C
Surge Current per Point	4A for 10ms each, repeatable every 1s @ 60°C
Minimum Load Current	2mA per point
Maximum On-State Voltage Drop	2V dc @ 2A
Maximum Off-State Leakage Current	1mA per point
Output Delay Time Off to on On to off	1ms maximum 2ms maximum
Scheduled Outputs	Synchronization within 65ms maximum, reference to the Coordinated System Time
Configurable Fault States per Point	Hold Last State, ON or OFF (OFF is the default)
Configurable States in Program Mode per Point	Hold Last State, ON or OFF (OFF is the default)
Fusing	Not protected - Fused IFM is recommended to protect outputs (See publication 1492-2.12)
Reverse Polarity Protection	None - If the module is wired incorrectly, outputs may be damaged.
Isolation Voltage Group to group User to system	100% tested at 2546V dc for 1s 100% tested at 2546V dc for 1s
RTB Screw Torque (NEMA)	7-9 inch-pounds (0.8-1Nm)
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm and Housing	20 Position RTB (1756-TBNH or TBSH) ¹
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing
Conductors Wire Size Category	22-14-gauge (2mm ²) stranded ¹ 3/64 inch (1.2mm) insulation maximum 1 ^{2,3}
Screwdriver Blade Width for RTB	5/16 inch (8mm) maximum
Agency Certification (when product or packaging is marked)	   Class I Div 2 Hazardous ⁴ Class I Div 2 Hazardous ⁴ marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-OH8I

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

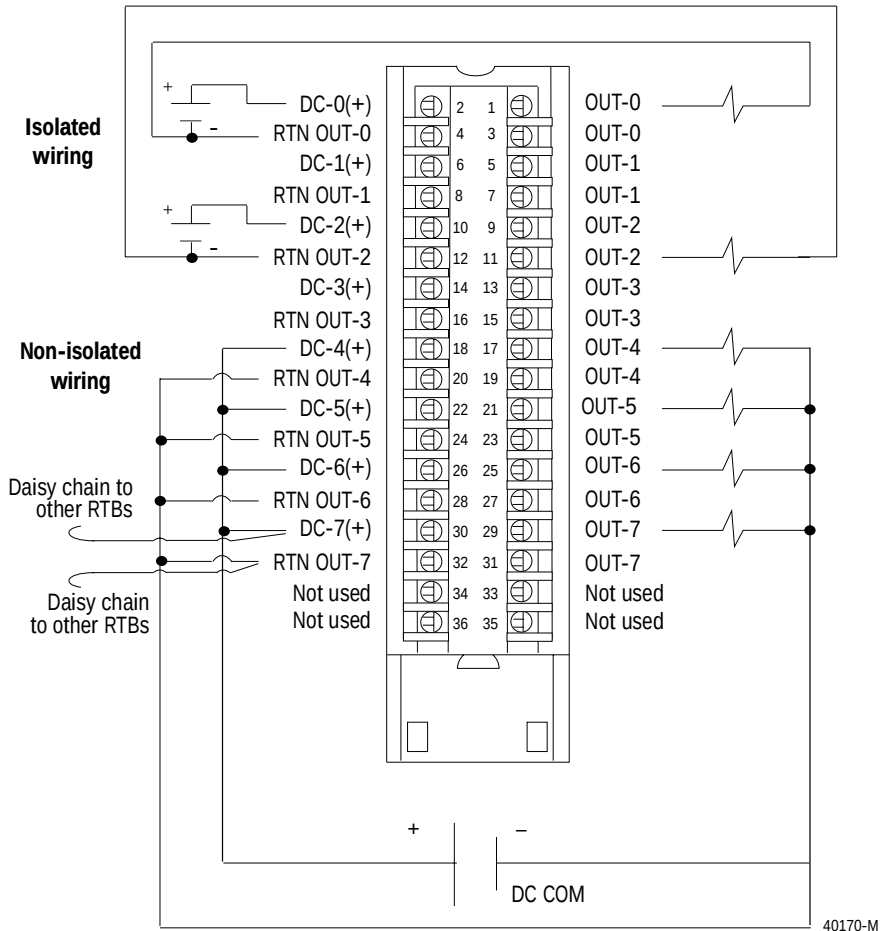
Feature	Default value	Page of description
Communications method	Standard output	
Program mode	Off	
Fault mode	Off	
Idle to fault transition	Disabled	

Wiring example

Use the following example to wire your module.

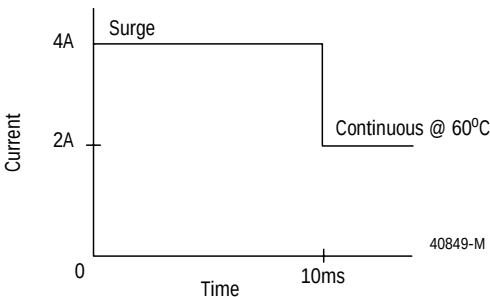
NOTES: All terminals with the same name are connected together on the module.
For example, the load can be connected to either terminal marked OUT-0.

When you daisy chain to other RTBs, always connect the daisy chain to the terminal directly connected to the supply wire, as shown above.



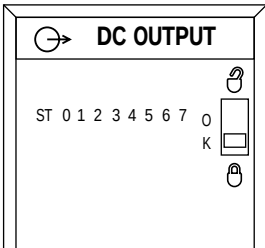
40170-M

Surge current chart



40849-M

LED indicator



40466-M

1756-OH8I Specifications

Number of Outputs	8 (individually isolated)
Module Location	1756 ControlLogix Chassis
Backplane Current	250mA @ 5.1V dc & 2mA @ 24V dc
Maximum Power Dissipation	3.3W @ 60°C
Thermal Dissipation	11.25 BTU/hr
On State Voltage Range	90-146V dc
Output Current Rating Per Point Per Module	2A maximum @ 60°C 8A maximum @ 60°C
Surge Current per Point	4A for 10ms each, repeatable every 1s @ 60°C
Minimum Load Current	2mA per point
Maximum On-State Voltage Drop	2V dc @ 2A
Maximum Off-State Leakage Current	1mA per point
Output Delay Time Off to on On to off	2ms maximum 2ms maximum
Scheduled Outputs	Synchronization within 65ms maximum, reference to the Coordinated System Time
Configurable Fault States per Point	Hold Last State, ON or OFF (OFF is the default)
Configurable States in Program Mode per Point	Hold Last State, ON or OFF (OFF is the default)
Fusing	Not protected - Fused IFM is recommended to protect outputs (See publication 1492-2.12)
Reverse Polarity Protection	None - If module is wired incorrectly, outputs may be damaged.
Isolation Voltage Channel to channel User to system	100% tested at 2546V dc for 1s 100% tested at 2546V dc for 1s
RTB Screw Torque (Cage clamp)	4.4 inch-pounds (0.4Nm) maximum
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm and Housing	36 Position RTB (1756-TBCH or TBS6H) ¹
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing
Conductors Wire Size Category	22-14-gauge (2mm ²) stranded ¹ 3/64 inch (1.2mm) insulation maximum 1 ^{2,3}
Screwdriver Blade Width for RTB	1/8 inch (3.2mm) maximum
Agency Certification (when product or packaging is marked)	   Class I Div 2 Hazardous ⁴ Class I Div 2 Hazardous ⁴ marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-ON8

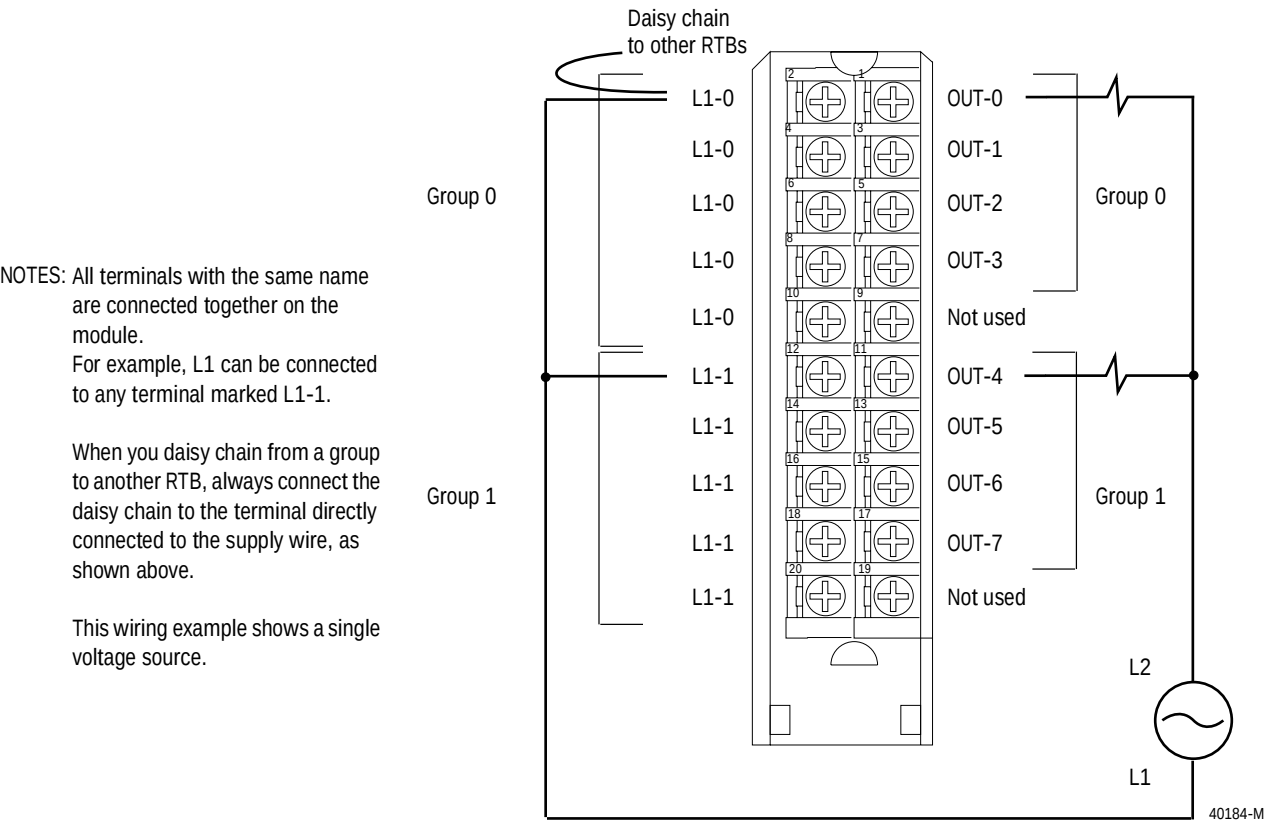
Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

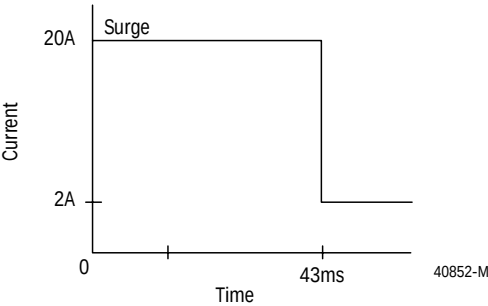
Feature	Default value	Page of description
Communications method	Standard output	
Program mode	Off	
Fault mode	Off	
Idle to fault transition	Disabled	

Wiring example

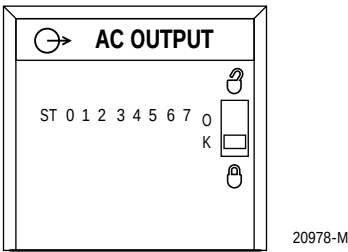
Use the following example to wire your module.



Surge current chart



LED indicator



1756-ON8 Specifications

Number of Outputs	8 (4 points/common)
Module Location	1756 ControlLogix Chassis
Backplane Current	200mA @ 5.1V dc & 2mA @ 24V dc
Maximum Power Dissipation	5.1W @ 60°C
Thermal Dissipation	17.39 BTU/hr
Output Voltage Range	10-30V ac, current>50ma 47-63Hz 16-30V ac, current<50ma 47-63Hz
Output Current Rating Per Point Per Module	2A maximum @ 60°C 5A maximum @ 30°C; 4A maximum @ 60°C (Linear derating)
Surge Current per Point	20A for 43ms each, repeatable every 2s @ 60°C
Minimum Load Current	10mA per point
Maximum On-State Voltage Drop	1.5V peak @ 2A & 6V peak @ load current<50mA
Maximum Off-State Leakage Current	3mA per point
Commutating Voltage	4V/μs for loads>50mA 0.2V/μs for loads<50mA ¹
Output Delay Time Off to on On to off	9.3ms @ 60Hz: 11ms @ 50Hz 9.3ms @ 60Hz: 11ms @ 50Hz
Scheduled Outputs	Synchronization within 65ms maximum, reference to the Coordinated System Time
Configurable Fault States per Point	Hold Last State, ON or OFF (OFF is the default)
Configurable States in Program Mode per Point	Hold Last State, ON or OFF (OFF is the default)
Fusing	Not protected - Fused IFM is recommended to protect outputs (See publication 1492-2.12)
Isolation Voltage Group to group User to system	100% tested at 2546V dc for 1s 100% tested at 2546V dc for 1s
RTB Screw Torque (NEMA)	7-9 inch-pounds (0.8-1Nm)
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm and Housing	20 Position RTB (1756-TBNH or TBSH) ²
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing
Conductors Wire Size Category	22-14-gauge (2mm ²) stranded ² 3/64 inch (1.2mm) insulation maximum 1 ^{3,4}
Screwdriver Blade Width for RTB	5/16 inch (8mm) maximum
Agency Certification (when product or packaging is marked)	 Class I Div 2 Hazardous ⁵  Class I Div 2 Hazardous ⁵  marked for all applicable directives

¹ The commutating dv/dt of the output voltage (OUTPUT to L2) should not exceed 0.2V/μs for loads under 50mA. The commutating dv/dt rating of the module for loads 50-500mA (OUTPUT TO L2) is 4V/μs maximum. If the commutating dv/dt rating of the TRIAC is exceeded, the TRIAC could latch on. If the commutating dv/dt rating is exceeded in the 10-50mA range, a resistor may be added across the output and L2. The purpose of this resistor is to increase the total output current to 50mA ($I=V/R$). At 50mA and above, the module has a higher commutating dv/dt rating. When adding a resistor for mthe output to L2, be sure it is rated for the power that it will dissipate ($P=(V^2)/R$). If the commutating dv/dt rating is exceeded in the 50-500mA range, the L1 AC waveform could be at fault. Be sure the waveform is a good sinusoid, void if any anomalies such as distorted or flattened sections.

² Maximum wire size will require extended housing - 1756-TBE.

³ Use this conductor category information for planning conductor routing as described in the system level installation manual.

⁴ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁵ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-OW16I Specifications

Number of Outputs	16 N.O. (Contacts individually isolated)
Module Location	1756 ControlLogix Chassis
Backplane Current	150mA @ 5.1V dc & 150mA @ 24V dc
Maximum Power Dissipation	4.5W @ 60°C
Thermal Dissipation	15.35 BTU/hr
Output Voltage Range	10-265V 47-63Hz/5-150V dc
Power Rating (steady state)	250W maximum for 125V ac resistive output 480W maximum for 240V ac resistive output 60W maximum for 30V dc resistive output 24W maximum for 48V dc resistive output 31W maximum for 125V dc resistive output 250VA maximum for 125V ac inductive output 480VA maximum for 240V ac inductive output 60VA maximum for 30V dc inductive output 24VA maximum for 48V dc inductive output 31VA maximum for 125V dc inductive output
UL Ratings	C300, R150 Pilot Duty
Minimum Load Current	10mA per point
Initial Contact Resistance	30mΩ
Switching Frequency	1 operation/3s (0.3Hz at rated load) maximum
Bounce Time	1.2ms (mean)
Expected Contact Life	300k cycles resistive/100k cycles inductive
Maximum Off-State Leakage Current	1.5mA per point
Output Delay Time Off to on On to off	10ms maximum 10ms maximum
Scheduled Outputs	Synchronization within 65ms maximum, reference to the Coordinated System Time
Configurable Fault States per Point	Hold Last State, ON or OFF (OFF is the default)
Configurable States in Program Mode per Point	Hold Last State, ON or OFF (OFF is the default)
Fusing	Not protected - Fused IFM is recommended to protect outputs (See publication 1492-2.12)
Isolation Voltage Channel to channel User to system	100% tested at 2546V dc for 1s 100% tested at 2546V dc for 1s
RTB Screw Torque (Cage clamp)	4.4 inch-pounds (0.4Nm) maximum
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm and Housing	36 Position RTB (1756-TBCH or TBS6H) ¹
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing
Conductors Wire Size Category	22-14-gauge (2mm ²) stranded ¹ 3/64 inch (1.2mm) insulation maximum ^{1,2,3}
Screwdriver Blade Width for RTB	1/8 inch (3.2mm) maximum
Agency Certification (when product or packaging is marked)	    Class I Div 2 Hazardous ⁴ Class I Div 2 Hazardous ⁴ marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

1756-OX8I

Configurable features

The following table lists the configurable features this module supports, the default value and the page of the feature’s description:

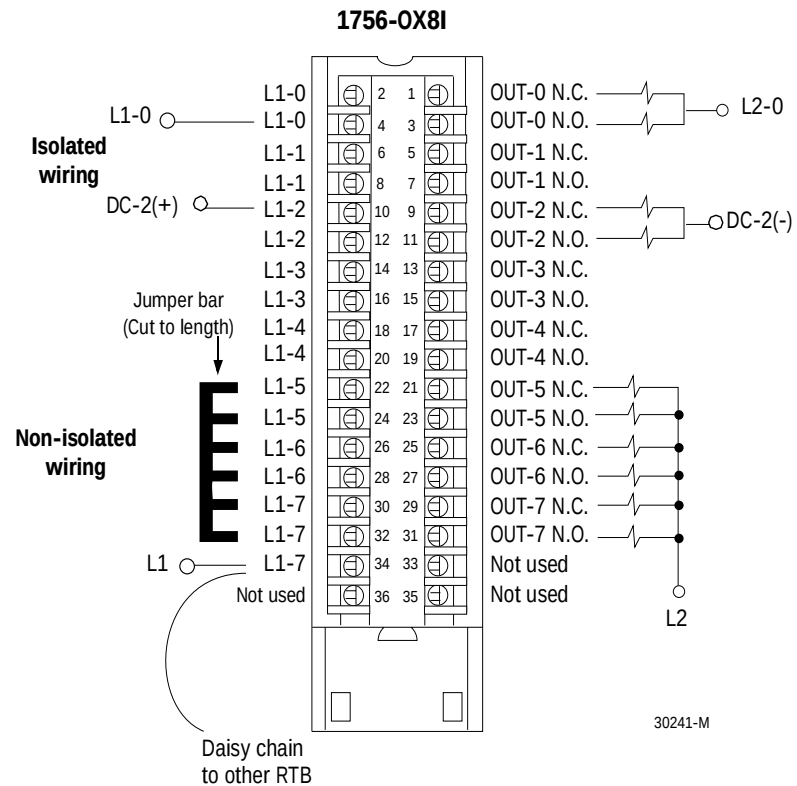
Feature	Default value	Page of description
Communications method	Standard output	
Program mode	Off	
Fault mode	Off	
Idle to fault transition	Disabled	

Wiring example

Use the following example to wire your module.

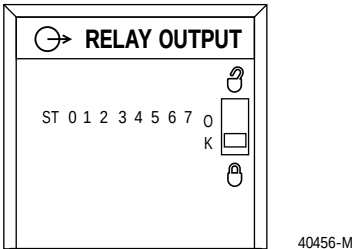
NOTES: All terminals with the same name are connected together on the module.
For example, L1-0 can be connected to either terminal marked L1-0.

When you use the third L1-7 terminal to daisy chain to other RTBs, always connect the daisy chain to the terminal directly connected to the supply wire, as shown in the example above.



Surge current chart

LED indicator



1756-OX8I Specifications

Number of Outputs	8 N.O. & 8 N.C. (2 points/common)
Module Location	1756 ControlLogix Chassis
Backplane Current	100mA @ 5.1V dc & 100mA @ 24V dc
Maximum Power Dissipation	3.1W @ 60°C
Thermal Dissipation	10.57 BTU/hr
Output Voltage Range	10-265V 47-63Hz/5-150V dc
Power Rating (steady state)	250W maximum for 125V ac resistive output 480W maximum for 240V ac resistive output 60W maximum for 30V dc resistive output 24W maximum for 48V dc resistive output 31W maximum for 125V dc resistive output 250VA maximum for 125V ac inductive output 480VA maximum for 240V ac inductive output 60VA maximum for 30V dc inductive output 24VA maximum for 48V dc inductive output 31VA maximum for 125V dc inductive output
UL Ratings	C300, R150 Pilot Duty
Minimum Load Current	10mA per point
Initial Contact Resistance	30mΩ
Switching Frequency	1 operation/3s (0.3Hz at rated load) maximum
Bounce Time	1.2ms (mean)
Expected Contact Life	300k cycles resistive/100k cycles inductive
Maximum Off-State Leakage Current	0mA
Output Delay Time Off to on On to off	13ms maximum 13ms maximum
Scheduled Outputs	Synchronization within 65ms maximum, reference to the Coordinated System Time
Configurable Fault States per Point	Hold Last State, ON or OFF (OFF is the default)
Configurable States in Program Mode per Point	Hold Last State, ON or OFF (OFF is the default)
Fusing	Not protected - Fused IFM is recommended to protect outputs (See publication 1492-2.12)
Isolation Voltage Channel to channel User to system	100% tested at 2546V dc for 1s 100% tested at 2546V dc for 1s
RTB Screw Torque (Cage clamp)	4.4 inch-pounds (0.4Nm) maximum
Module Keying (Backplane)	Software configurable
RTB Keying	User defined mechanical keying
Field Wiring Arm and Housing	36 Position RTB (1756-TBCH or TBS6H) ¹
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing
Conductors Wire Size Category	22-14-gauge (2mm ²) stranded ¹ 3/64 inch (1.2mm) insulation maximum 1 ^{2,3}
Screwdriver Blade Width for RTB	1/8 inch (3.2mm) maximum
Agency Certification (when product or packaging is marked)	    Class I Div 2 Hazardous ⁴ Class I Div 2 Hazardous ⁴ marked for all applicable directives

¹ Maximum wire size will require extended housing - 1756-TBE.

² Use this conductor category information for planning conductor routing as described in the system level installation manual.

³ Refer to publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines"

⁴ CSA certification—Class I, Division 2, Group A, B, C, D or nonhazardous locations.
FM approved—Class I, Division 2, Group A, B, C, D or nonhazardous locations.

Chapter Summary and What's Next

In this chapter you learned about:

- module specific information

Move on to Chapter 6 to learn how to troubleshoot your module.

Troubleshooting

What this Chapter Contains

This chapter describes the indicators on the ControlLogix digital modules and how to use them to troubleshoot the module. The following table describes what this chapter contains and its location.

For information about	See page
Using Indicators	
Chapter Summary and What's Next	

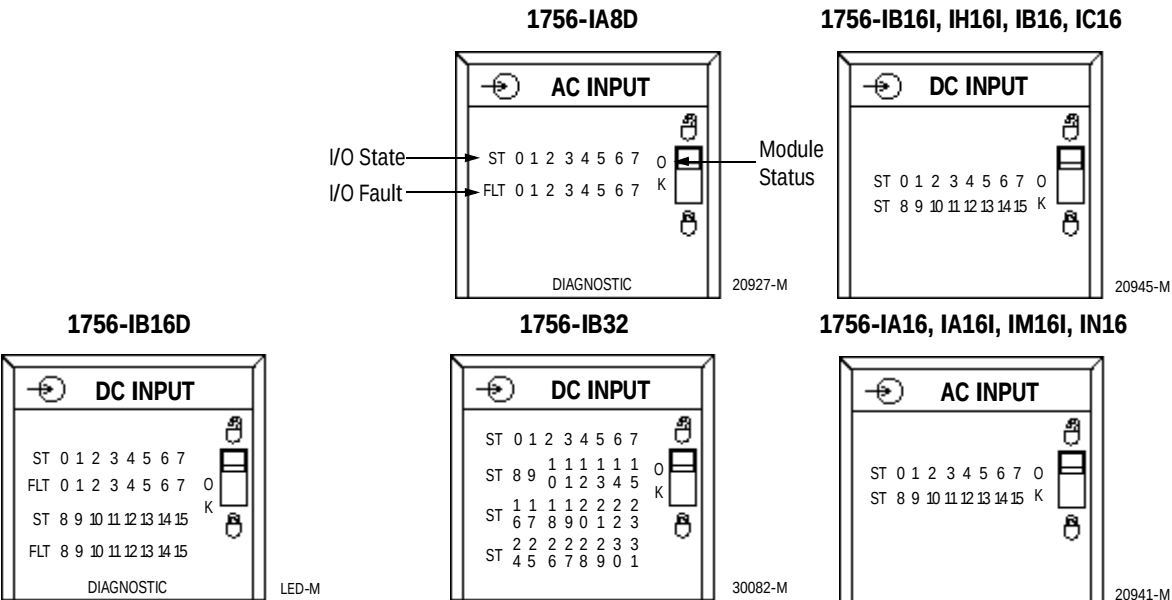
Using Indicators

Each ControlLogix I/O module has indicators which show individual I/O state, fault, or fuse status (yellow). A bi-colored LED indicates module status with an “OK” (red/green). LED indicators are located on the front of the module.

LED indicators for input modules

LED indicators	This display:	Means:	Take this action
OK	Steady green light	The inputs are being multicast and in normal operating state.	None
OK	Flashing green light	The module has passed internal diagnostics but is not multicasting inputs.	None
OK	Flashing red light	Previously established communication has timed out.	Check controller and chassis communication.
OK	Steady red light	The module must be replaced.	Replace the module.
I/O State	Yellow	The input is active.	None
I/O Fuse	Red	A short overload fault has occurred for this point.	Check wiring for short overload.
I/O Fault	Red	A fault has occurred for this point.	Check this point at the controller.

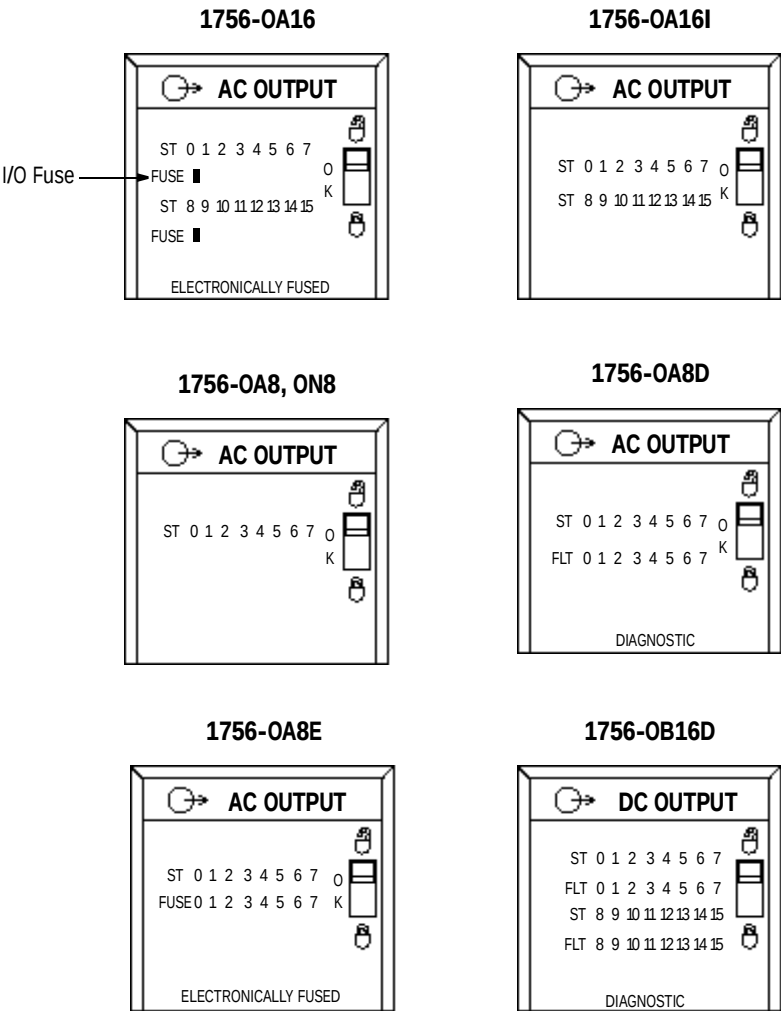
The following LED indicators are used with ControlLogix modules:



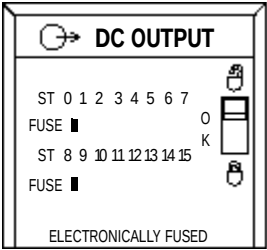
LED indicators for output modules

LED indicators	This display:	Means:	Take this action
OK	Steady green light	The outputs are actively being controlled by a system processor.	None
OK	Flashing green light	The module has passed internal diagnostics but is not actively controlled.	None
OK	Flashing red light	Previously established communication has timed out.	Check controller and chassis communication.
OK	Steady red light	The module must be replaced.	Replace the module.
I/O State	Yellow	The output is active.	None
I/O Fuse	Red	A short overload fault has occurred for this point.	Check wiring for short overload.
I/O Fault	Red	A fault has occurred for this point.	Check this point at the controller.

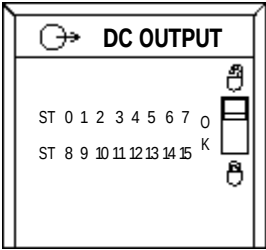
The following LED indicators are used with output modules.



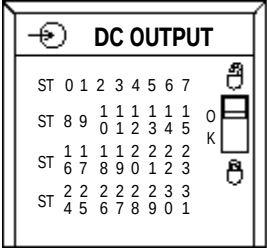
1756-OB16E



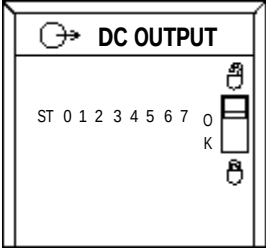
1756-OB16I



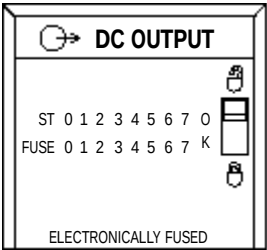
1756-OB32



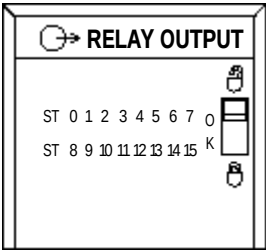
1756-OB8, OC8, OH8I



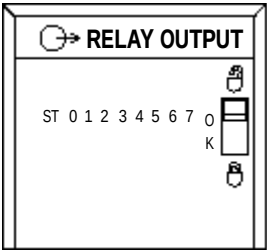
1756-OB8EI



1756-OW16I



1756-OX8I



Chapter Summary and What's Next

In this chapter you learned about:

- troubleshooting the module

Move on to Appendix A to see specifications for each module.

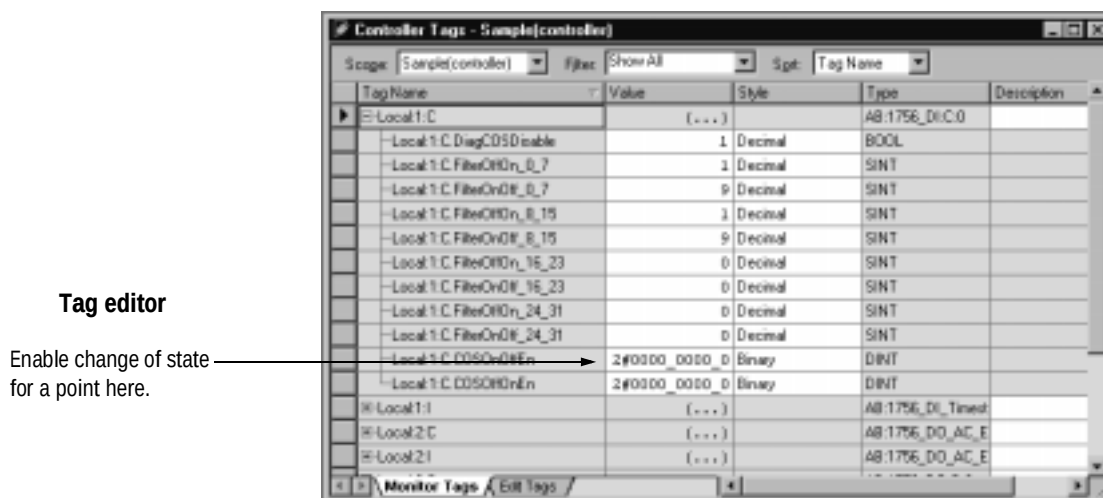
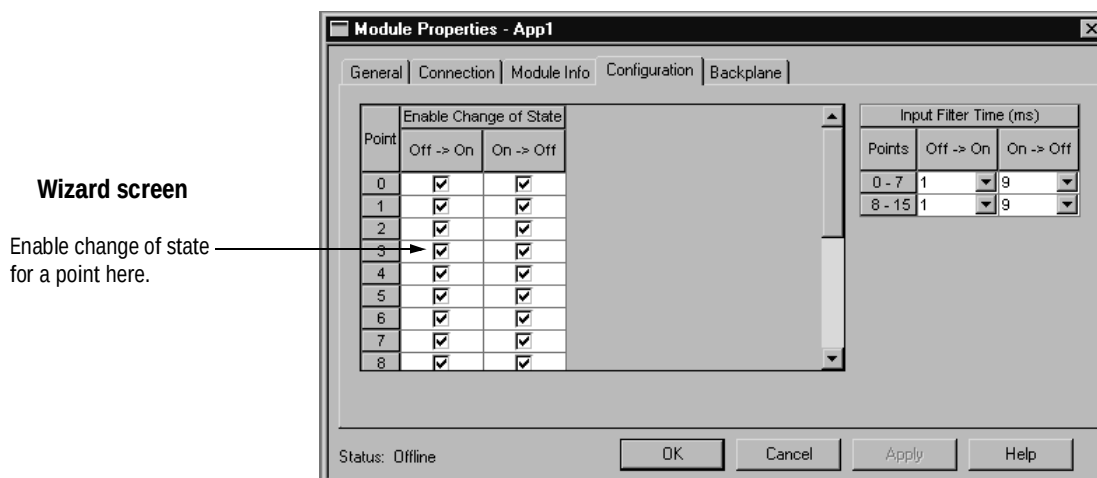
Using Software Configuration Tags

When you write configuration for a module, you create tags in the Tag Editor of RS Logix 5000. Each configurable feature on your module has a distinct tag in the processor's ladder logic. The tag editor allows you change configuration without a PC.

The series of tags that are generated vary for each module. There is also variation among the tags for any particular module, depending on which Communications method you chose during configuration.

For example, the 1756-IA16I module has four choices for Communications Method: Input Data, CST Timestamped Input Data, Listen Only-Input Data, Listen-Only CST Timestamped Input Data.

The following screens show the difference between enabling change of state for a point on the 1756-IA16I module through the Wizard screens or the Tag Editor.



Both screens perform the same function on the module.

Module Tag Names and Definitions

The set of tags associated with any module depends on the type of module and the Communications Method chosen during configuration. There are two sets of tags, one for input modules and one for output modules, from which a module draws its tags.

Input Modules' Tags

The following table lists and defines all tags that may be used for ControlLogix digital input modules.

Note: Each application's series of tags will vary but no input module application will contain any tags that are not listed here.

Name (as listed in the Tag Editor)	Configuration or I/O Data	Definition
COSOnOffEn (1 bit per point)	Configuration	Change of State ON to OFF – Triggers an event in the controller for ON to OFF transition of input point and causes the input module to update the data table as soon as possible. The CST timestamp is also updated. 0=disable, 1=enable
COS OffOnEn (1 bit per point)	Configuration	Change of State OFF to ON – Triggers an event in the controller for OFF to ON transition of input point and causes the input module to update the data table as soon as possible. The CST timestamp is also updated. 0=disable, 1=enable
COSStatus (1 bit per point)	Input data	Change of State Status – Indicates if desired Change of State (COS) transition (ON to OFF or OFF to ON) has occurred for a point. This feature must be enabled by COSOnOffEn or COSOffOnEn and can only be used with Event Triggering in the Controller. See COSOnOffEn, COSOffOnEn, CSTTimestamp, DiagCOSDisable. 0=no transition detected, 1=transition detected
CSTTimestamp (8 bytes)	Input data	Coordinated System Time Timestamp – Timestamp can be configured to indicate the time that data changed (see COSOffOnEn, COSOnOffEn, COSStatus, DiagCOSDisable) and/or the time that a diagnostic fault occurred (see OpenWireEn, FieldPwrLossEn).
Data (1 bit per point)	Input data	Off/On status for the input point. 0=Off, 1=On
DiagCOSDisable (per module)	Configuration	Diagnostic Change of State –
Fault (1 bit per point)	Input data	This is an ordered status of faults which indicates that a point is faulted and input data for that point may be incorrect. Check other diagnostic faults, if they are available, for further diagnosis of the root cause. If communication to the input module is lost, then all points for the module will be faulted. 0=no fault, 1=fault (OpenWire or FieldPwrLoss or Comm Fault)
FaultLatchEn (1 bit per point)	Configuration	Fault is Latched – If enabled for a point, any OpenWire or FieldPwrLoss will stay latched in the faulted state even if the fault no longer exists until the User clears the fault. 0=disable, 1=enable latching
FieldPwrLoss (1 bit per point)	Input Data	Field Power Loss – AC input diagnostic detects that field power has failed or is disconnected from the module. Open Wire will also be detected. 0=no fault, 1=fault
FieldPwrLossEn (1 bit per point)	Configuration	Field Power Loss – Enables Field Power Loss diagnostic. 0=disable, 1=enable
FilterOnOff_0_7 etc. (1 byte per group)	Configuration	Filter Times ON to OFF – Filter time for digital filter in digital input modules for ON to OFF transition. Operates on groups of 8 points. Valid DC filter times=0, 1, 2, 9, 18ms Valid AC filter times=1, 2ms

Name (as listed in the Tag Editor)	Configuration or I/O Data	Definition
FilterOffOn_0_7 etc. (1 byte per group)	Configuration	Filter Times OFF to ON – Filter time for digital filter in digital input modules for OFF to ON transition. Operates on groups of 8 points. Valid DC filter times=0, 1, 2ms Valid AC filter times=1, 2ms
OpenWire (1 bit per point)	Input data	Open Wire – Diagnostic which detects that a wire has been disconnected from the input point. If a group of points all show this fault, then possibly the return (L1 or GND) is missing from the module. Also see FieldPwrLoss. 0=no fault, 1=fault
OpenWireEn (1 bit per point)	Configuration	Open Wire – Enables Open Wire diagnostic. 0=disable, 1=enable

Output Modules' Tags

The following table lists and defines all tags that may be used for ControlLogix digital output modules.

Note: Each application's series of tags will vary but no output module application will contain any tags that are not listed here.

Name (as listed in the Tag Editor)	Configuration or I/O Data	Definition
CSTTimestamp (8 bytes)	Input data	Coordinated System Time Timestamp – Timestamp of diagnostic input data including fusing (see BlownFuse, NoLoad, OutputVerifyFault, FieldPwrLoss), which is updated whenever a diagnostic fault occurs or goes away.
CSTTimestamp (8 bytes)	Output data	Coordinated System Time Timestamp – Timestamp to be used with Scheduled Outputs and Coordinated System Time (CST). Used to synchronize outputs across the system by indicating the time (CST Timestamp) at which the output module is to apply its outputs.
Data (1 bit per point)	Input data	Off/On status for the output point. 0=Off, 1=On
DataEcho (1 bit per point)	Input data	Data Echo – Off/On status for the output point ECHOED back from the output module. This is used to verify proper communication only. No field side verification is done. For field side verification, see OutputVerifyFault. 0=Off, 1=On
Fault (1 bit per point)	Input data	This is an ordered status of faults which indicates that a point is faulted and I/O data for that point may be incorrect. Check other diagnostic faults, if they are available, for further diagnosis of the root cause. If communication to the input module is lost, then all points for the module will be faulted. 0=no fault, 1=fault (FuseBlown, NoLoad, OutputVerifyFault, FieldPwrLoss, or CommFault)
FaultLatchEn (1 bit per point)	Configuration	Fault is Latched – If enabled for a point, any NoLoad, OutputVerifyFault or FieldPwrLoss will stay latched in the faulted state even if the fault no longer exists until the User clears the fault. This does not affect FuseBlown; it is always latched. 0=disable, 1=enable latching
FaultMode (1 bit per point)	Configuration	Fault Mode – Used in conjunction with FaultValue to configure the state of outputs when a communications fault occurs. See FaultValue. 0=Use FaultValue (OFF or ON), 1=Hold Last State
FaultValue (1 bit per point)	Configuration	Fault Value – Used in conjunction with FaultMode to configure the state of outputs when a communications fault occurs. See FaultMode. 0=OFF, 1=ON
FieldPwrLoss (1 bit per point)	Input Data	Field Power Loss – AC output diagnostic detects that field power has failed or is disconnected from the module. No Load will also be detected. 0=no fault, 1=fault

Name (as listed in the Tag Editor)	Configuration or I/O Data	Definition
FieldPwrLossEn (1 bit per point)	Configuration	Field Power Loss – Enables Field Power Loss diagnostic. 0=disable, 1=enable
FuseBlown. (1 bit per point)	Input Data	Fuse is Blown – An electronic or mechanical fuse has detected a short or overload condition for an output point. All FuseBlown conditions are latched and must be reset by the User. 0=no fault, 1=fault
NoLoad (1 bit per group)	Input data	No Load – Diagnostic which indicates the absence of a load (e.g. the wire is disconnected from the module). This diagnostic only operates in the OFF state. 0=no fault, 1=fault
NoLoadEn (1 bit per point)	Configuration	No Load – Enables No Load diagnostic. 0=disable, 1=enable
OutputVerifyFault (1 bit per point)	Input data	Output Verify – Diagnostic which indicates that the output has been commanded to the ON state but the output has not been verified to be ON. 0=no fault, 1=fault (output is not ON)
OutputVerifyEn (1 bit per point)	Configuration	Output Verify – Enables Output Verify diagnostic. 0=disable, 1=enable
ProgMode (1 bit per point)	Configuration	Program Mode – Used in conjunction with ProgValue to configure the state of outputs when the controller is in Program Mode. See ProgValue. 0=Use ProgValue (OFF or ON), 1=Hold Last State
ProgValue (1 bit per point)	Configuration	Program Value – Used in conjunction with ProgMode to configure the state of outputs when the controller is in Program Mode. See ProgMode.. 0=Off, 1=On
ProgToFaultEn (1 byte per module)	Configuration	Program to Fault Transition – Diagnostic enables the transitioning of outputs to FaultMode if a communications failure occurs in Program Mode. Otherwise outputs will remain in ProgramMode. See ProgMode, ProgValue, FaultMode, FaultValue. 0=outputs stay in ProgramMode if comm failure 1=outputs got to FaultMode if comm failure

Accessing the Tags

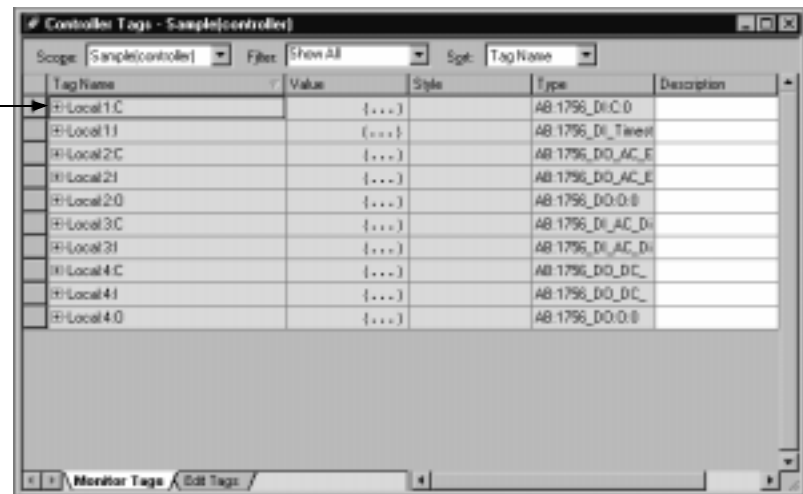
You can access a module's tags through RS Logix 5000 as shown below.

1. Select Controller Tags
2. Click on the right mouse button to display the menu
3. Select Monitor Tags

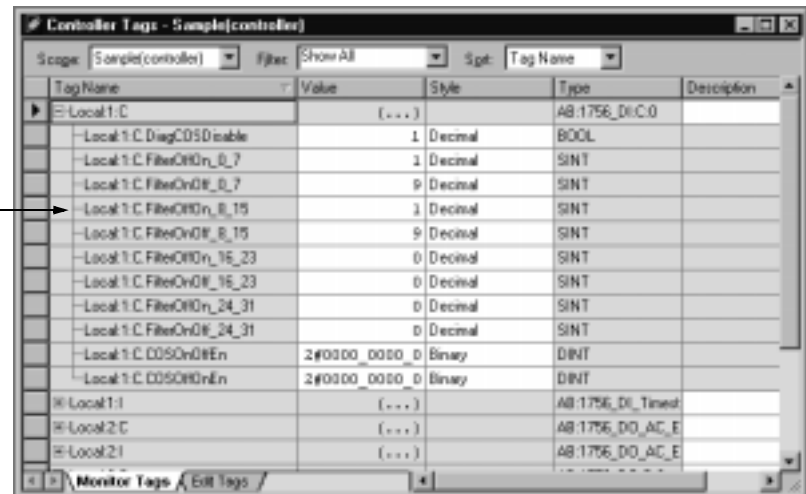


You can view and change tags from here.

Click on the slot number of the module you want to see.



You can change configuration information for any of the points listed below Local 1:C.



Changing Configuration Through the Tags

Sample Series of Tags

The following screens provide an example of the tag associated with a 1756-IN16 module that was configured using **CST Timestamped Input Data** for its Communications Method.

The configurable features for this configuration are as follows:

- Change of State – can be enabled for each point
- Filter Times – can be set for groups of 8 points

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